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THE OUTLINE OF MAN'S KNOWLEDGE

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GLAD OF EARTH
THE EARTH TURNS SOUTH
THE TIDE COMES IN
THE EAGLE FLIES

THE OUTLINE OF MAN'S KNOWLEDGE

The Story of

History ~ *Science* ~ *Literature*
Art ~ *Religion* ~ *Philosophy*

BY

CLEMENT WOOD

Decorations by
LOUIS BROMBERG

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INTRODUCTION

Men and women have been grouped enduringly into the quick and the dead. The dead know nothing; or what knowledge they have is stagnant. The quick know somewhat, and seek to learn more. In the accelerated tempo of modern living, the quick literally hunger and thirst after knowledge. Two main problems tease their minds for answering: What is the individual's object in life? What is the collective aim of the civilized society in which the individual lives?

Man's leading thinkers have established that the object of society is to socialize man's achievements: to make real that dream of high-souled poets and well-wishers for man, that every man and every woman be given an opportunity to share equally in the rich heritage of man's awkwardly triumphant past. Achievements consist primarily in *knowledge:* in ways and methods that man has invented for doing things, ranging from the way to mix a salad to the method of building the Parthenon, a symphony, or a philosophy.

The individual's object is to live, in the fullest, amplest, sense: and he can do this best by gathering what facts he can about the universe, by arranging them logically, and by learning how to use them. Only knowledge can let a man or woman round into a developed human being. It was Keats who has one of his aspiring strugglers say, "Knowledge enormous makes a god of me."

The object of this book, to present in a lively narrative form all of the important knowledge that man has gained in every field, has held men's minds since civilization began. The great half-forgotten Macedonian thinker, Aristotle, did the best that his unscientific day permitted to factualize this dream, aided by all the resources of his patron, the world-treading Macedonian, Alexander the Great. The brilliant French Encyclopedists, fired by the awakening spirit that in the end brought on that bath of blood called the French Revolution, attempted the same task. Today, scholars, in the various encyclopedias, have dressed up man's knowledge with elaborate scholarliness: but an encyclopedia, as reading matter, is as dull as a rusty iron knife, as doughy as a half-cooked biscuit; its information is too technical to answer a questioning human mind.

Modern man is groping, with eyes half opened, for information as to the world's knowledge. In this age of extreme and withering specialization, it is almost too much for any man or woman to master thoroughly even his or her own trade or profession. If the lawyer knows his law thoroughly, if the printer knows his craft to the last detail, if the woman at home or in business or politics masters her field, there is little time left to learn what the wide rest of the world has done and thought, and is doing and thinking. Yet a man or woman, learned only in one craft, is less than a half-man or half-woman. One can live thousands of lives in expanding knowledge of the lives of others, or die a wilting death in the darkening twilight of ignorance. The lawyer is a better lawyer and a better human being if he knows something of man's past and present; the same is true of the printer, the man or woman in business or politics, the woman at home. Where can this essential knowledge be found—in such a presentation that it is compellingly interesting, as well as accurate?

Man's recent fumbling after knowledge has expressed itself in specialized summaries. Outlines of religion, of science, of history, of art, of literature, of philosophy, are available on every hand: usually in several expensive volumes, and occasionally told dully and with inaccuracies and omissions. The time is ripe for one volume that will embody the important facts in all these fields, emphasizing not the individual facts, but the living relationships between these facts.

The Outline of Man's Knowledge is such a book. It is really six complete volumes:

Book I. The Outline of History.
Book II. The Outline of Science.
Book III. The Outline of Literature.
Book IV. The Outline of Art.

Book V. The Outline of Religion.
Book VI. The Outline of Philosophy.

The book holds the latest fruits of man's researches in every important expedition after truth; together with the relationships between these facts. The material has been gathered in a lifetime of study—this author's lifetime; it represents the thinking achievements of the lifetime of the human race. This book is not a fragmentary outline, but a complete systematization of all man's knowledge, with a logical framework in which every fact can be promptly placed, available for immediate use in a moment of need.

The man or woman who has been from ten to thirty years out of school once learned some of these facts, usually wrongly interpreted. During the time since formal schooling ended, he has learned to interpret the facts more accurately; in the meantime, many of the facts have been forgotten. This book holds both facts and interpretation: the latest facts that science has mastered, the interpretation of vigorous modern minds glorying in every conquered bit of territory carved out of the dark shores of ignorance. The young man or woman, boy or girl, will find it an invaluable systematizer of information and methods of thinking. By giving the right start in knowledge, it will check an early spendthrift waste of time: and what is man's one life on earth but an inheritance of days and hours, to be spent but once, with death merely the end of the priceless inheritance? What saves time saves life: this book does that.

As I write these opening sentences, a tiny globe—a spherical representation of the earth, with its vast oceans stained blue, and its continents and islands bright with differing colors—is before me on my desk—a globe purchased for a dime at a Ten Cent Store. Turn, in reality or imagination, to consider for a moment a similar globe. Here is our earth-world as it is—shaped almost like an apple, four-fifths of its surface covered with water, and this broken by three great land masses, the small continent of Australia, the twin continents of the Americas, and the vast triple group of Asia, Europe, and Africa, the scalloped triangle of two of these tied to the third by the Isthmus of Suez. The great earth-globe whirls up through starry space, spiralling around its sun; summer and winter, seedtime and welcome harvest, come from this strange upward whirling.

To the man or woman, boy or girl, who knows nothing or little about history, science, literature, art, religion, and philosophy, or whose store of facts in these fields is poorly digested or badly arranged, this globe says nothing. As I idly whirl it with a touch of a single finger, Asia passes before my eyes: Asia, with its strange dormant Chinese and Japanese civilizations and religions; Java, with our earliest human ancestor; India, with our immediate Aryan ancestors, and centuries of conquest by fierce Mongol nomads; the ancient civilizations of Babylon, Nineveh, and Tyre; that small stretch at the eastern fringe of the Mediterranean from which sprang Moses, David, Isaiah, and three great world religions, Judaism, Christianity, and Islam.

Europe passes before my eyes, as I continue to whirl the globe: Europe, home of the wandering Neanderthal men, the earliest Negroids, the tall Cro-Magnon race; and, after these, the singing glory of Greece, the grandeur of red-handed Rome, Italy of the high-hearted artistic Renaissance, Spain and its exquisite Moorish culture, iron-heeled Germany, France of Charlemagne and Joan of Arc, England with its world-girdling might, and Russia, with its cold vision turned toward tomorrow.

Africa passes before my eyes, with the stony glory of its Egyptian past, and the tropic richness of the present, with the continent the thieves' booty of the white races.

The Americas swing past in their broken crescent, with Mongol arriving from the farther West, and spreading from Hudson Bay and Alaska southward to the tip of Tierra del Fuego; with Celtic, Scandinavian, and Italian explorers conquering the westward sea path to its rich shores; with French chevalier, Spanish grandee, Dutch patroon, and English cavalier and roundhead disputing the heart of the northern half, out of whose conflicts arises the major power in the world today; with Spanish and Portuguese oppression in the south, and an end to this oppression.

Australia, as the globe spins onward, rises almost at the bottom of the earth-globe, with its isolated strange families of primitive men and more primitive animals, and its convict-based reach upward toward democracy and man's brotherhood.

And the endless islands, divorced by the sundering waves one from the other.

History, science, literature, art, religion, philosophy, throw their light on all of these, deeply enriching the moment's vision of them. Once man's knowledge has become your own, the whirling globe will speak as eloquently and poignantly to your heart.

It is knowledge that men—the vast majority of men—have lacked for so long. This lack of knowledge has stained every land and every sea-way with the spreading scarlet of spilt blood. Lack of knowledge has caused that strange self-mutilating trait of mankind, the organization of hatred, in the form of dreadful group rivalries and wars. Man has never organized love with any effectiveness. This is the task of man's future; and only knowledge can lead into this.

In the perfecting of the various sections of the book, others have graciously aided, by suggestion or editorial reading. In the field of history, especial gratitude is due to Professor James Harvey Robinson, Meade Minnegerode, and Gamaliel Bradford; in the book of science, to Edwin E. Slosson and William Beebe; in the domain of literature, to Gamaliel Bradford, Johan Smertenko, and Meade Minnegerode; in the treatment of art, to John Sloan, Antonio Salemme, and J. Franklin Whitman, Jr.; in the presentation of the world's religions, to Dr. Charles Prosper Fagnani of Union Theological Seminary, and Dr. Robert Norwood, rector of St. Bartholomew's Church, New York City; in the analysis of philosophy, to Professors John Dewey and William P. Montague. Especial credit is due to Gloria Goddard for aid in the whole book, especially in the fields of literature and philosophy; and for writing the section on Cabinet-Making and Furniture, the only portion of this book written by an outside hand. CLEMENT WOOD.

New York City.

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(The interpretative verses under the decorations are by Clement Wood.)

THE OUTLINE OF MAN'S KNOWLEDGE

BOOK I

THE OUTLINE OF HISTORY

I. The Coming of Civilization

THE UNIVERSE EVOLVES MAN

In the beginning, science tells us, was energy.

Man does not know, and may never know, the earlier steps by which this energy transformed itself into its twofold forms of energy and matter, and shaped itself into the present altering universe. For man knows only by his dull limited senses, as we shall learn more fully in the study of psychology. For him to understand all of the universe would be as futile an ambition as for a molecule of iron, rooted near the center of an iron wheel beneath a car of a train, to seek to understand all about train, engine, roadway, the passing landscape, the destination of the train, and exactly what is passing in the engine's cab forever far ahead.

A glance at our universe shows a small hot star, our sun, surrounded by eight smaller dark stars, or planets, and many still smaller bodies, such as planetoids and comets; and shows many small planets, satellites, or moons, circling around certain of these larger planets. This tiny family group, or solar system, is almost midway of a vast irregular bracelet of starry suns, shaped somewhat like a doughnut; this immense bracelet of stars is called the Milky Way. Here and there along its course may be seen thousands of bodies called spiral nebulae, some of which are probably remote Milky Way universes lying still beyond man's farthest measurement.

The most accepted explanation of the formation of such a star group as our solar system is the famous nebular hypothesis, or suggested explanation, of the French astronomer Laplace. According to this explanation, the evolution of our solar system began with a vast revolving fiery nebula, or cloud of gases, in whose center the sun slowly formed, cooled, and hardened. Contraction toward the center, during its cooling, left great nebulous rings, also revolving, which condensed ultimately into the planetary masses. A similar process might construct smaller planets, or moons, revolving around some of the sun's planets.

Later scientists came to doubt the necessity for the tremendous heat Laplace had attributed to the original nebulous body; these authorities suggest that the solar system's origin might have been great gaseous tidal swirls, caused by the near passing of some giant sun. This would pull out protuberances on the central body, which might become ejected, and ultimately combine into the planets. Less than one per cent of the sun's mass, thrown out in this fashion, would be enough to make the entire planetary system. In some modified form, Laplace's picture of the origin of our sun's family group will persist as man's clearest vision of our beginning.

Nothing in the universe stands still; everything is evolving, altering, changing constantly: at least, this is the definite message which our senses bring to us. The earth's spinning motion is slowly growing less; which means that the day is slowly growing longer. The time will come when, like our moon, the earth will cease to spin, and will turn an unchanging face upon the slowly cooling sun. In the end, it will probably unite with the sun in a brief fiery union. But this is far in the remote future.

The earth, then, began as a small fragment of the sun, far hotter than it is now, and slowly cooling. How small, or how large, is this earth of ours? A line through the center from surface to surface, called the earth's diameter, is a little less than 8,000 miles—7,927 miles at the equator, and 7,900 miles through the poles. The earth's highest mountain, Mount Everest in the Himalayas, is only 29,141 feet high; the deepest place in the ocean yet measured, a depression in the Pacific ocean bed off Japan, is only 32,644 feet deep. This range of 61,785 feet, or a little less than 12 miles, between the bottom of the ocean and the top of the highest mountain, is all that we know intimately of earth—a mere surface skin on the earth, of water broken by jagged upthrusts of land. We know of no life except in this twelve miles of surface skin of the earth, and a little way into the air above it.

A diagram may make this clearer, stretching from A, the earth's center, outward in any direction:

A.

Earth's center	3,945 lifeless miles	12 miles of life	Infinite lifeless miles of outer space

The earth, science tells us, is more than 1,497,000,000 years old. Life began about 1,000,000,000 years ago, at a time when the sun was hotter, the day and night swifter, the tides and heat vaster, than today, all of this accompanied by tremendous storms and earthquakes. The earth's crust hardened, surrounded by a watery envelop in the form of steam or vapor. There was nearly as much of this steam as if all the seas and oceans were today converted into steam. When this steam condensed into water, altering the deeper valleys and chasms of earth's crust into the seas and oceans, there still remained an atmosphere or gaseous air envelop consisting of nitrogen, carbon dioxide, water vapor, and some free oxygen. These last four are the principal materials out of which life evolved.

The shallow shore sea is the mother of all life. Out of these four materials, with a small amount of other substances, evolved a substance or organization of matter differing only in two ways from lifelessness: it had

1. Spontaneous mass movement; and
2. Irritability.

This substance was living matter, and is called protoplasm; Huxley calls it "the physical basis of life." Life was, by its very nature, highly unstable, compared with lifeless matter; it needed constantly to absorb particles of its environment, and to eject them again, in order to maintain the chemism or chemical action constantly taking place within it. From this need of acting as an unstable channel through which parts of the universe entered and left, arose digestion, reproduction, and, much later, sex. Unstable life needed to escape its hostile environment, which would otherwise have soon reduced it back to lifelessness. From this arose irritability, feeling or interest (a desire toward something or away from something), and, in the end, brain, intellect, and what is called soul.

The earliest forms of life were too fragile to leave permanent record in the book of the rocks, the fossilized history of early life. Soon enough the living matter evolved to a sufficient hardness of structure to be preserved in the ancient rocks. Between the earliest protoplasm and man, as we shall learn in detail in Book II: *The Outline of Science,* there are only 24 main steps: these show life evolving through one-celled and many-celled organisms, worms, sea-squirts, lamprey-eels (the first vertebrates, or backboned animals), fishes, amphibians, reptiles, early mammals like the strange Australian duckbill, marsupials or pouched animals like kangaroo and opossum, lemurs (the lowest genuine monkeys), the higher monkeys, the anthropoid or manlike apes, the extinct Pithecanthropoi (ape-like, and yet true men, found especially in fossils on the island of Java), and, lastly, man as we know him.

The book of the rocks is an infinitely broken and disorderly volume. Countless stony pages are shattered, thrust out of place, or dissolved entirely: earthquake, volcanic action, water and ice or glacial erosion, have made it difficult enough to read in its right order. Yet scientists have painstakingly pieced the story together, and have located the lowest rock layers or strata as the Azoic, or lifeless, rocks. Above these is the Protozoic (beginning of life) series, containing remains of algae or low plants, like the green scum found today in stagnant ponds; and also marked with the tracks of dull sluggish sea worms. Above these lie the Paleozoic or ancient life rocks, holding fossils of shellfish, worms, seaweed, and great sea scorpions reaching a length of nine feet. Next comes the Mesozoic or middle life period, where the remains of the giant reptiles are found, some a hundred feet long—mute evidence of the saurian or reptile age. Above these are the Cainozoic or recent life rocks, a chapter in the book of the earth still unfinished.

Life began in the water. Even the highest plants must acquire their diet of chemicals from the soil dissolved in the water; and all plants below the flowering plants, the fourth of the great plant kingdoms, reproduce or mate sexually only in water, as in the case of mosses and ferns. No animal can breathe, no creature can digest its food, without water. The oxygen in the air must be dissolved in water in animal lungs; the highest animal's food must be turned to a liquid before it can be absorbed. The forms of shore-water and sea life altered first to the amphibians, who dwelt both on sea and land; these altered to the tremendous swimming, walking, and flying reptiles; and these to birds, and to the swimming mammals, such as whales, the walking mammals, such as lions, monkeys, and men, and flying mammals, like bats.

About 500,000 years ago, the ape-like man roamed Java. Some 250,000 years later, a less ape-like race, the Heidelberg men, wandered throughout Europe, and perhaps Asia. This was during one of the partial withdrawals of the great ice glaciers of the Glacial period. Perhaps 75,000 years ago a race called the Piltdown men, also called the dawn men, inhabited England and other parts of Europe. From 25,000 to 50,000 years later, after the present partial withdrawal of the glaciers, the widespread Neanderthal race, which inhabited much of Europe and parts of Asia, gave way to *Homo sapiens,* "thinking man," much as we know him today, first appearing in the Grimaldi Negroids, the Cro-Magnon race, the Grenelle and other races. The book of the rocks establishes these facts beyond argument. In the case of all these successive races, there must have been some intermingling, so that some of the blood of all these races groping upward toward full manhood flows in human veins and arteries today.

All of these essential alterations in lifeless and living matter will be explained fully in Book II: *The Outline of Science.* This overture to man's history merely summarizes the theme of the magnificent story, the development from the original whirling fiery cloud, through sun and planet, up the long ladder of life to man.

MEN IN THE STONE AGES

History, properly defined, means the written record of mankind: but the ages just before writing was discovered are of great importance. The story of mankind is the story of successive steps toward the slow conquest of man's environment. This environment, which had to be tamed, consisted of great beasts of prey; extremes of temperature, both cold and hot; flood, wind, and drouth; the pathlessness of forest and mountain and sea; the inertia or resistance of matter against being shaped into tools, weapons, utensils, and dwellings; the recently discovered pigmy enemies in the germ and microbe world; and the far fringes of polar ice, ocean depth, and airy height. Much of man's energy is still spent in warring with his fellow men, instead of the needed warfare against a hostile environment. An increasing amount of his energy is being directed against his real foe, the environment; or, to word it better, against the environment, that material which he must tame.

Man's immediate ancestors were not the great tree-dwelling manlike apes, the gorilla, baboon, gibbon, and orang-outang, as Fundamentalists believe science teaches; they were some extinct running apes of the early Cainozoic or recent life period, who skulked in the rocks and did not haunt primarily salt or fresh water districts. Man's inborn inability to swim establishes this last fact conclusively. The fossil records are largely made up of water-dwelling creatures, whose skeletal remains are preserved in water deposits; they are necessarily almost blank about man's immediate ancestors. Yet they furnish enough significant evidence; and occasional caves, in which sub-men and early men left their traces, furnish more. The immense majority of the earth's rocks are still to be studied for further testimony.

The higher monkeys are tool-users. Darwin tells how baboons open nuts by breaking them with handy stones, and even use sticks to pry up rocks and strike blows. The chimpanzee builds itself a hut by intertwining tree branches. The first stones used by sub-men and early men were used as they were picked up, without alteration. The first rudely altered stones must have been merely roughly chipped, in order to afford a firmer grip or a sharper cutting surface.

Some scientists hold that wooden implements came first, shell implements second, and stone last of all. Whether wood and shell preceded stone or not, the former have largely decayed and disappeared. But tools of flint, agate and quartz may not decay in a million years; and men have found every stage of implement widely scattered over the earth. Different localities reached different stages of progress at sharply differing times. Today, the white races are in the age of the radio and the airplane; backward races still use stone implements: South Sea Islanders and certain African natives still make use of wood and the sharp-edged shells of land and water shellfish as tools. But the order of development, as revealed by the discovered tools, is always similar. There was first a period whose tool remains cannot be identified; stones and wooden clubs were used without shaping changes. Then came the crudest stones, called Eoliths, or dawn-stones. After these came the Paleolithic or Old Stone Age—the age of chipped stone. This varies from the crudest flaking to the exquisite laurel-leaf pattern of the Solutrean stage of toolmaking (named after the tool station of Solutré, near the Saone River, in France). This Old Stone Age stretched over more than 100,000 years; it was followed by the Neolithic, or New Stone Age, the age of polished stone. After this came the Bronze Age, and then the Iron Age, blending into the Steel Age. We are still in this period. In four chief ways man's ancestors began to differ from the types of living manlike apes:

In the easily erect attitude.
In the opposable thumb, which may be brought against each of the fingers.
In the growth of the front of the brain; and
In the acquisition of the power of speech.

Man's first human ancestor was missing until a Dutch army surgeon, Eugen Dubois, excavating on the Bengawan River near Trinil in central Java—an island long ago connected with the mainland of Asia, as geologists have established—discovered in fossil form two teeth, the top of a skull, and a thigh bone, which he and other scientists identified as the remains of a sub-man called Pithecanthropos erectus, the erect or walking ape-man. In September, 1926, Professor Heberlein of the Netherlands Government Medical Service discovered a complete skull of this same creature, thereby putting the existence of this race in Java beyond dispute. The ape-man was closer to man than to the apes; and for a time he was held to be a sub-man, just below man. Sir Arthur Keith, the British anthropologist, has pointed out with finality:

> The brain is less in size than the smallest known in any modern man or woman, but it possessed convolutions which mark the human brain.

The ape-like Java man, as well as his successors of the next 500,000 years, was altogether human. The geological stratum in which the remains were found establishes that the race existed in the Pleistocene period of the Cainozoic age, 500,000 years ago, just about the beginning of the long Ice or Glacial Age.

The second stage in the story of men comes from the discovery, in 1907, by Schoetensack, in the Mauer sands near Heidelberg, Germany, of a single jaw, which has been described as belonging to the Heidelberg race of men, who lived about 250,000 years ago, in the second withdrawal of the glaciers northward.

About 100,000 years ago occurred the third warm interglacial period. Men existed widespread in Europe during this period, along with the mammoth, the rhinoceros, the hippopotamus, the sabre-tooth tiger, elephants, and many lesser species of mammals. In successive layers along the River Somme at St. Acheul, in France, we find a record preserved of man's gradual improvement in the making of chipped stone tools. The stone hammer was first used, to give a sharpened edge; then came the retouch, with a second stone, which knocked small chips off alternate sides of the cutting edge, giving a saw-like effect; also sharp edges, which might injure the user's hand, were chipped until they became blunt and harmless. Other tools found thus early are the planing tool, the scraper, the borer for hides and wood, the knife, and the throwing-stone. There were no stones designed exclusively for warfare as yet; man, as we shall find later, was still in the matriarchal period, the period of mother rule; and general warfare did not come in until the patriarchal period, the period of father rule.

At Piltdown, in Sussex, England, Dawson, in 1911, found many fragments of a skull, which were pieced together. This early man, clearly closer to modern man than the Javanese ape-like man or the Heidelberg man, was called Eoanthropos, or dawn man. He lived about 75,000 years ago, and is believed to have been the immediate ancestor of modern races of men.

The next race of men appear in the fossilized remains of the race called the Neanderthal men, which are found scattered throughout Europe—in Krapina (in Croatia, Hungary, where three hundred fragments of human bones were discovered) ; on the north face of Gibraltar; in the Neanderthal near Dusseldorf, Germany; in France, Moravia, Belgium, and on the island of Jersey, off England. The Heidelberg man is supposed to have been the ancestor of the Neanderthal. Many of these bodies are complete, having been given ceremonial burial, which points toward some shadowy belief in existence after death. These early men were short-skulled, broad-headed, with retreating chin, and somewhat dwarfish in height, which averaged five feet. They lived in caves, as did the cave lion, the cave bear, and the cave hyena. Scientists are not agreed as to whether this race was absorbed into the next race, *Homo sapiens,* ancestors of true modern man; or whether it became extinct. The evidence points to an almost complete extinction, about 50,000 to 25,000 years ago, when the last withdrawal of the glaciers commenced.

Succeeding them came the Grimaldi or Negroid race, found in a cavern near Mentone, France, in 1906 by Vernau. In addition to skeletal remains, statuettes reproducing the appearance of this race were found in the caves of Bassempuoy, France; in Grimaldi; near Willendorf, Austria; at Laussel, in southern France; and at Lespugne. This Negroid race, which then covered Europe, was very similar to the existing Hottentots in south Africa. Existing Negroid types in Italy and southern France are regarded as the recrudescence of the vanished ancestral type. English scientists point out that these proto-Negroids or early Negroids once covered Europe, and were absorbed into later European blood; so that even the Nordic has his share of Negro blood.

At about the same time came the Brunn race, probably entering Europe directly from Asia through Hungary; a long-headed race with narrow face, perhaps forerunners of the Neolithic or polished stone invasion; the Furfooz or Grenelle race, very broad-headed, entering Europe probably from central Asia; and, most important of all, the widespread Cro-Magnon race, splendidly tall, and noted for artistic ability. In 1823 the first Cro-Magnon skeleton was discovered, in the Pavliand cave, in western Wales. In 1852 seventeen skeletons were discovered at Aurignac, in France; and there have been many discoveries since. The race was tall, broad-faced, and with large brain capacity. The men varied from 5 feet 11 to 6 feet 4; "there were giants in those days."

This race had quaint burial customs, including painting the skeletons, a burial mantle of perforated shells, with some food placed beside the bodies, indicating some belief in a survival of existence after death. This Aurignacian period of culture, named from the discoveries in the caves of Aurignac, marks the beginning of definite art. This art ranged from the primitive mammoth painted in red in the cavern of Pindal, with only two legs, to the exquisite tinted bisons on the ceiling of the cavern at Altamira, Spain, where four colors were used. These were countless drawings in all stages of completion, as well as little carved figures in talc, limestone, and soapstone. Human skulls were shaped into drinking-cups. Elaborate carvings were made on reindeer horn. This art, as well as that of the Grimaldi Negroids, is kin to early native African art, pointing to the probability that the Cro-Magnons travelled along the north shore of Africa, and thence into Europe. This was a hunting race, as its art shows; the Cro-Magnons pursuing mammoths, reindeer, bison, aurochs, and wild horses, their favorite food. At a camping place near

Solutré, the bones of more than 100,000 horses were discovered, dating from this period.

The period from about 16,000 B.C. ("Before Christ," the method of dating events occurring before the date given as the birth of Christ) and onward, called the Magdalenean period, marks the height of the Old Stone civilization. Then came a sudden decline, whose reasons cannot be arrived at with certainty. The race did not disappear, but broke up into many colonies, some of which may have lasted far into historical time. Near Dordogne, France, today, survivals of the Cro-Magnon race may be identified; the same is true of parts of Thuringia, and the recently extinct race of the Guanches of the Canary Islands, as well as at Lannion in Brittany, and on the island of Oleron off the west coast of France.

This brings us down to nearly 10,000 B.C. About this time men of different races, using polished stone implements, appeared in France, and then in the Swiss lake regions, where they built their lake-dwellings on high piles driven into the lake bed. Agriculture began, and nomadic or wandering life, first as hunters and then as shepherds, gave place to more settled living in carefully constructed dwellings. Pottery appeared, marking the transition from savage to barbarian. Animals—the dog first, then cattle, sheep, goats, and pigs,—had been domesticated during the roaming nomadic period; now, with agriculture, plants were domesticated as well. These users of polished stone had existed in the island of Crete as early as 14,000 B.C., and in Susa, Persia, about 20,000 B.C. Slowly they spread westward into Europe, following their food, as they exhausted the land in which they lived. They learned to cultivate wheat and barley, but not rye or oats; ground the grain, and roasted it into heavy solid bread, some of which survived in the Neolithic middens, or piles of kitchen waste. They dressed both in skins and in a rough flax cloth. They acquired the use of bronze; squatted, having no chairs; and used the ax, and the bow and arrow.

They may have had some stringed musical instruments, and certainly had skin-headed drums.

It is possible that up to this time the Mediterranean basin had been largely a valley, holding two great landlocked inland seas, the freshwater eastern one fed by a stream from the Red Sea, the Nile, the Adriatic "river," and a Greek source; and a saltier western sea, perhaps connected to the other by an overflow stream; and that about this time the Atlantic broke over the land wall at Gibraltar, slowly wore down the rocky channel, and poured its flood into the Mediterranean basin, making one vast sea of the two inland seas and the pleasant valleys beside them, where Old Stone and New Stone men had roamed, hunted, and dwelt.

Asia, where man probably originated, holds vast steppes and pasture lands, from which all the races of men may have come. Asia has been called "the womb of the races." Old Stone men, as hunters, wandered widely; New Stone men, as herders, led a wandering or nomadic life, limited to the pasture lands; and their successors, the agriculturists, were more bound to the soil than man had been in either earlier period. Wandering Old Stone men carried their few crafts with them; implements identical with those discovered in France, Spain, and England, have been found high above the present level of the Nile, as well as in South Africa and Asia; I have found implements of the identical type from Mexico northward all the way to Canada. The races of men are not different species, for they interbreed freely with one another; they are merely varieties of one race.

We are most familiar with the Caucasian or white race, found in Europe, the Mediterranean coasts, and western Asia. Huxley divided this variety of men into two types, the northern blonds and the Mediterranean and North African dark whites or brunets. Some scientists without great necessity add a third or intermediate type, round-skulled where both of the others are long-skulled—the so-called Alpine race.

Over eastern Asia and America a second group, the Mongolians, is dominant, generally with yellowish skins, straight black hair, and sturdy bodies.

In Africa the Negroes, the black race, are found. Throughout Australia and New Guinea the black, primitive Australoids inhabit. There are other racial pockets throughout the continents—Asiatic types in parts of Africa, wavy-haired fairish Ainu in Japan, as well as Negro-like tribes in parts of Persia and India.

Europe, just before history begins, was inhabited by the New Stone Mediterranean or Iberian race, a small race probably closely related to the Egyptians. The dark Iberian tribes, including the Basques of Spain, were thrust westward by the advancing floods of a taller, fairer people, speaking an Aryan tongue, called the Celts. These pushed their way to the Atlantic, and all that remained of the Iberians was mingled with Celtic blood. The Celtic language differentiated into the speech of Gaul, Welshman, Breton, Scotchman, and Irish Gaelic, as well as many lost languages. At the same time other Nordic Aryans poured into the Italian and Greek peninsulas, following the westward moving Celts, and developed the Latin and Greek speech. Other Aryan tribes drifted across the Baltic and into Scandinavia, their speech variegating into Swedish, Danish, Norwegian, and Icelandic, as well as Gothic and Low and High German. Another dialect of an Aryan group, Slavonian, was the parent of Russian, Polish, Bulgarian, Serbian, and other tongues; a more southerly migration from Asia Minor and Persia became Armenian and Indo-Iranian, from which Sanskrit and Persian sprang.

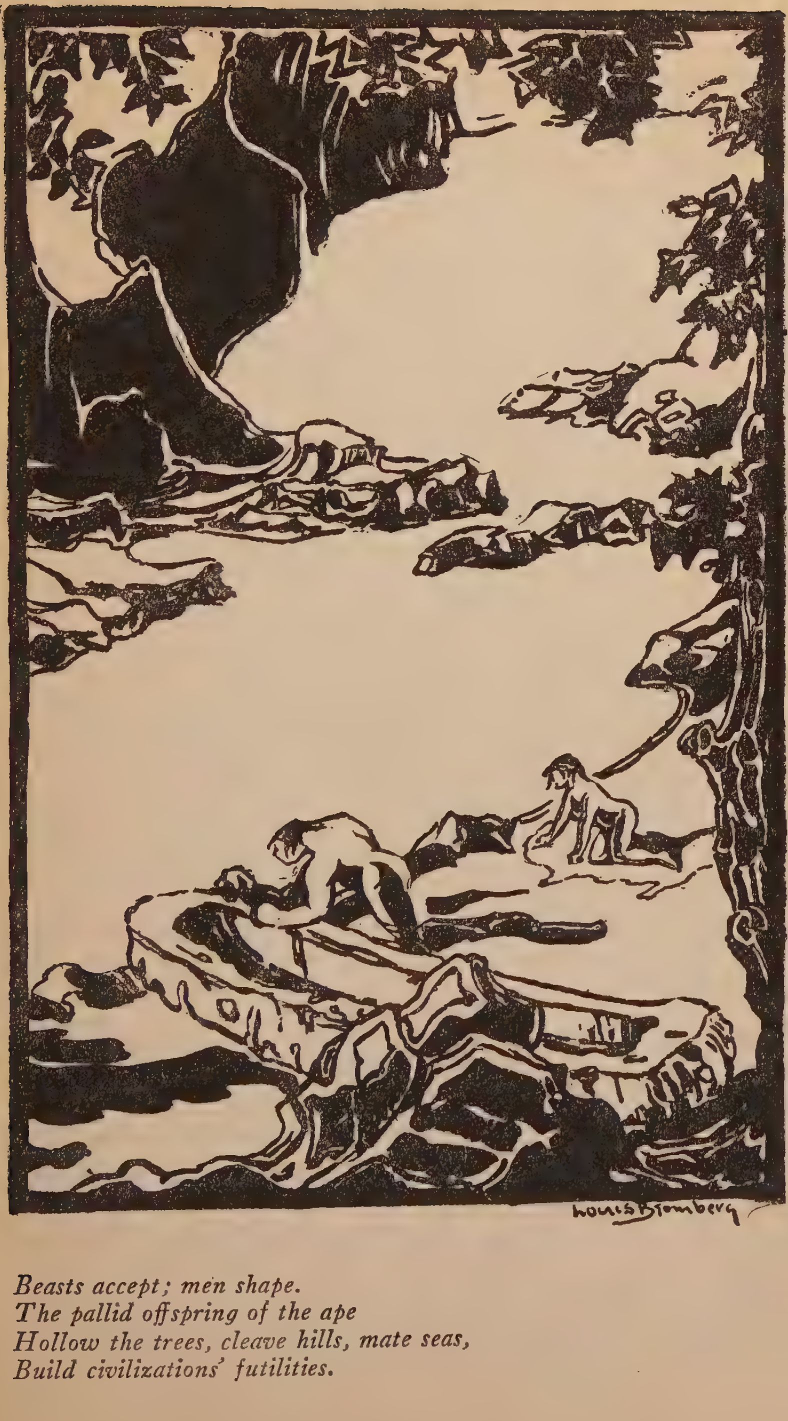
HUMAN LIFE DURING THE STONE AGES

Man's story is the story of achievements, which consist primarily in inventions, or ways of doing things. The skeleton summary of racial changes must be expanded by a brief glance at the important early inventions. It was the Neanderthal man who made the tremendous early discovery that man could tame that chemical process called fire. This may have come from proximity to volcanic fire, from striking stones together, or by some other method, or a combination of all of these. Slowly the savage brain discovered how to create fire, to conserve it, to confine it within useful bounds. Growing out of this, by a series of trials and errors, man learned how to cook his animal and then his cereal food, how to make pottery, and how to smelt metals out of the rock. The use of metals was a late discovery, commencing with rude pounding of copper; and, somewhat by accident, upon the invention of that alloy of copper and tin (which are often found together) called bronze. It was only in historic times that the smelting of iron was invented.

For a dwelling place, the rigor of the weather early sent man into the caves to live; a milder climate permitted living in the open, near some water-course. This living in the open was rendered pleasanter by the invention of rude wind shelters of boughs, at first on one side of the encampment, and then around and above the sleeping place. The skins of animals gradually came to be used to supplement, and then to replace, the leafy boughs.

Food was indispensable to primitive man, as to all life. At first this consisted of whatever organic matter was handiest—insects and worms, berries, fruits, and nuts, birds' eggs, young birds, fish, plants, roots, and even corpses of animals. Man was not finicky in his taste, at the beginning. The slow invention of weapons, and, later, of traps and snares, made it possible to kill the smaller mammals, and, at times, the larger ones as well. A slaughtered prey or a discovered dead body of an animal would have part of its flesh eaten on the spot, and the rest of the flesh, and the cherished bones, carried into the cave or skin-shelter, where the rest of the flesh would be eaten, and the bones cracked open to let man suck the marrow. Improvement in hunting, and especially the domestication of animals, furnished a more constant animal food supply.

Then came the taming of plants, in the form of primitive agriculture. Frazer, in his fascinating *The Golden Bough*, points out that this art arose from burying customs. Primitive man, vaguely deciding that the surviving and half-bodied soul would need food in its shadowy life after death, buried animal food and cereal grains with the corpse, in the dis-


Louis Bromberg

Beasts accept; men shape.
The pallid offspring of the ape
Hollow the trees, cleave hills, mate seas,
Build civilizations' futilities.

turbed soil in which the dead tribesman was placed. This was the ideal condition for the cereal grains to sprout; and the dull mind of the savage at first imagined that a dead body was essential to the production of grain, whereupon a tribesman, and later a captive, would be slain, to make sure that the field would be fertile. As Charles Lamb points out in his whimsical *Essay on Roast Pig,* the Chinaman accidentally discovered the delights of this cooked food when his house burned down, roasting a pig in the process; and for quite a time thereafter men burned down houses to get roast pig. Later they discovered a less expensive method; and human sacrifice gradually faded into symbolism, and then vanished altogether, from agriculture.

As the Cro-Magnon culture came in, improvements were made in every aspect of life. Dwellings were made half underground, with rock walls. Hunting became a dominant activity, requiring a close study of the lives of the prey, especially of the vast herds of wild ponies that roamed the European plains at the period. Tools and implements, especially of stone, were brought to such a high degree of perfection, that the exquisite flaked flint blades are quite as sharp as steel. The discovery that chalk, ochre, charcoal, and other substances made marks on other stones, and on human bodies, led to the invention of primitive art, both in the form of painting, and in the form of body-decorating; while primitive sculpture grew out of man's tool-making, and his inevitable study of the qualities of the stones tested and used. A tremendously useful weapon, the bow and arrow, came in about this time.

Then came a race with superior skill, the use of polished stone weapons and tools; and the chipped stone savages slowly were exterminated or blended with their conquerors. Hunting slowly gave way to the domestication of animals, and shepherding. Architecture, especially in the Swiss lake dwellings, reached a definite perfected utility. Agriculture came in the way described, to supplement and then largely to replace shepherding. In many parts of Europe, as in the English Stonehenge, these polished-stone savages erected megaliths, or great stones for sacred purposes. Stonehenge itself consisted of two inner circles of great stones surrounded by a larger circle and a ditch, and covering more than 28 acres, with two long avenues of stone, each a mile and a half long, running west and south from it on either side of Silbury Hill. Such a vast monument points to an elaborately organized tribal life, with populous villages. Rude woven cloth came in, and pottery: and this latter marked the end of the state of savagery in human culture, and the beginning of barbarism. This is an arbitrary division adopted by anthropology; it points to the fact that throughout the world, wherever the use of pottery is found, man at about that time emerges from savagery into the higher state of barbarism. Burial customs, dating from long before this time, indicate simply the belief that death is a sleep; and a sleep, as savage minds knew, was followed by a waking. Belief in survival of life after death was no more than a development of this crude idea that death was a sleep; it did not at first enter the savage mind that there could be sleeps that have no waking.

EARLY SLAVE EMPIRES: MESOPOTAMIA

That human institution called the state, or human government, as Franz Oppenheimer brilliantly points out, came perhaps in every case from the dominance of a group of conquerors, as a ruling caste, over the conquered natives. The purpose of the state was the exploitation of the vanquished by the victors. The history of every land verifies this. In Mesopotamia, the fertile river bottoms of the Tigris and the Euphrates, state followed state with each conquest: Babylonian, Amorite, Assyrian, Arab, Median, Persian, Macedonian, Parthian, Mongolian, Seldshuk, Tartar, Turk, being only a few in the long line. On the Nile, the Hyksos Semites, the Nubian, Persian, Greek, Roman, Arab, Turkish, English came and formed their states. In Italy, Etruscan, Romano-Teuton, Roman, Ostrogoth, Lombard, Frank, German ruled; in Gaul, Roman, Frank, Burgundian, Norman dominated; in Spain, Carthaginian, Roman, Vandal, Visigoth, Arab controlled; in Britain, Celt, Saxon, Norman held sway. India, China, the Americas illustrate the same thing. The only exception is recent countries like the United States of America, where the method is more advanced than mere conquest of native residents. In such cases, the citizens who are exploited import themselves, by immigration, and thus enter the class of the governed and exploited. The hunter, the early herder, killed their enemies conquered in battle. The nomad herdsman invented an advanced method of treatment, by which he spared his captured enemy, and enslaved him. Land-robbers founded landed or feudal states; and sea robbers, like the Vikings, founded similar sea or city states. The stages of development are:

1. Looting.
2. Partial looting, to preserve the territory for later looting.
3. Tribute exacted from the conquered.
4. Settlement of the conqueror on the same land with the conquered.
5. The conquering lord becomes king and judge of both races.
6. Ultimate amalgamation of the two races, as two social classes, a governing class and a governed class.

This ends the preliminary evolution of the state. The Danish conquest of England illustrates this thoroughly. Early destructive looting was followed by systematic looting, which preserved the English cities for further looting; this was followed by the exaction of a tribute from the English, to buy off later looting; by the settlement of the Danes on English soil; by a Danish king over England; and by the beginning of the sixth step, which failed because of Danish weakness, and the coming of William the Norman as a more powerful conqueror. The same steps may be found, in full or in part, in every early instance of state formation.

One of the first civilizations developed in Mesopotamia, the eastern tip of the "fertile crescent" joining the Nile Delta with the valleys of the Tigris-Euphrates river systems. The earlier Sumerian conquerors, governing from Akkad, gave way to Semitic tribesmen, governing from Babylon. Under the mighty lawgiver Hammurabi, about 2100 B.C., the first

Babylonian Empire was founded. The hill-land Semites called Assyrians then conquered this empire, under Tiglath-Pileser I, in 1100 B.C. Nineveh, the stone city, as distinguished from Babylon, the brick city, became the capital. For 400 years the Assyrians were held back by the Aramean power in Syria, midway of the Fertile Crescent, its capital being Damascus. In 745 B.C. a second Assyrian conqueror, Tiglath-Pileser III, overran this country, exiling the ten conquered tribes of Israel, and founding the New Assyrian Empire. Two of his successors, Sargon II and Sennacherib, completed the conquests, the latter progressing as far as the borders of Egypt, where a pestilence stopped further victory. This king's grandson, Assurbanipal or Sardanapalus, conquered and for a time held lower Egypt. The fresh Semitic Chaldeans from the south, assisted by the northerly Medes and Persians, in 606 ended the Assyrian empire; Nebuchadnezzar and his successors governed until 539, when Persia under Cyrus ended their reigns.

Trade and government taught the early Sumerians to invent a picture-writing, called cuneiform or wedge-shaped from the wedge-stroke constituting all the characters. This picture-writing developed into a phonetic or sound writing, in the end the Sumerians having 350 syllable-sounds. They never developed a more simplified writing, based upon the consonant and vowel sounds. The calendar was of twelve moon months, with an extra month now and then to make up the solar or sun year. The numbering was duodecimal, or based upon 12 instead of 10; our arithmetic is decimal, based upon 10. From their duedecimal system we receive our 60 minutes to the hour, our 60 seconds to the minute, our 24 hours to the day, and our 360 minutes on the geometrical circle.

The land lacked stone; hence sun-baked bricks were used instead in all architecture. These have weathered into mere mounds of shapeless clay marring the even plains. Babylonian and Assyrian libraries consisted of clay tablets, and even letters and bills were written upon bricks. The life of a postman in these early days was much like that of the driver of a load of bricks. The great ruler Hammurabi uttered a celebrated Code of Laws, which has been unearthed and deciphered; later codes, like the Mosaic code in the Bible, borrowed largely from this. The earliest Semitic Sumerian gods gave way successively to the Babylonian Marduk, and the great Asiatic goddess of love and fertility, Ishtar or Ashtaroth. Sculpture and painting reached a high stage, with great wall-paintings or murals showing emperors, nobles, priests, conquered tribes, and magnificent wild beasts.

THE EGYPT OF THE PHARAOHS

Fairgrieve points out that geographical conditions, such as the seasonal changes in water needed for farming, and the protection of deserts, high hills, and the sea, were largely responsible for the early growth of civilization in Mesopotamia. It took such a natural problem as the seasonal changes in the water supply to spur man's mind up to creating a civilization. Egypt was even more protected, at the southern tip of the Fertile Crescent, than Mesopotamia, at its eastern extremity. The land consisted of a rainless valley, amply watered by the Nile's seasonal flows, protected by the desert on three sides, with the sea-wall at the north. Old Stone and New Stone relics are found in abundance; and about 5000 B.C. the true Egyptian appears upon the scene—a relative of the Iberian Mediterranean peoples.

The Old Kingdom (3000–2500 B.C.) lasted through the IVth dynasty, or ruling family; and included Cheops or Khufu and other builders of the enormous pyramids, the star-pointing tombs of these egotistic monarchs.

After the XVIth dynasty the "shepherd kings" or Hyksos, Arabian Semites, conquered the land. These were expelled by the natives at about the time that Hammurabi was ruling Babylon. About 1600 B.C. commenced the resplendent New Empire, Thothmes III and his son Amenophis III ruling from Ethiopia to the Euphrates. After a brief Syrian conquest of Egypt came Rameses II, of the XIXth dynasty, who is supposed by some to have been the pharaoh or king whom Moses bearded and bullied. To the XXIInd dynasty belonged Shishak, who plundered Solomon's temple about 930 B.C. An

Ethiopian conqueror established the XXVth dynasty, which went down in 670 B.C. before the New Assyrian Empire of Tiglath-Pileser III and his successors. Psammetichus and Necho, of the XXVIth dynasty, briefly restored native rule. In the sixth century B.C. Egypt, as well as Chaldea-Babylon, was subjugated by the Persians. After 60 years of independence, in 332 she bowed to Alexander the Great, and was thereafter ruled entirely by foreigners.

Egyptian writing was at first picture writing, containing in the end over 600 signs, many of which came to stand for whole syllables. As early as 3000 B.C. the Egyptians invented an alphabet of twenty-four letters; but the sign-group habit was too strong, and persisted. After the early engraving on stone, the writing was done on papyrus, or thin strips of a river reed pasted together. The hieroglyphic or priestly writing, carefully pictorial, was replaced by a rapid running writing called hieratic, where pen and ink on papyrus took the place of the more laborious early engraving and sign-drawing.

The calendar was based upon the moon-month; later the year was divided into twelve months of thirty days each, with a five-day holiday week at the end; and, later, with the addition of the extra day in leap years. This calendar (except for the leap year addition) was devised in 4241 B.C., and its introduction is the earliest dated event in history. Each year was given a name, (as, "in the year of the great flood")—a method used by North American Indians and other races down to the rediscovery of America in 1492, and even since that date in some places. About 4000 B.C. the Age of Metals was entered, with copper as the first metal reduced from the ore. The chief gods were the sun god Re (pronounced "ray") or Ra, and the Nile, symbolized as the god Osiris. Egyptian stone architecture and sculpture, as in the pyramids, the temples at Karnak and Luxor, the great sphinx, and the obelisks, are still ranked among the wonders of the world: we will learn more of the art of all primitive peoples in Book IV: *The Outline of Art.* Amenhotep IV, in 1375 B.C., tried to reform the religion into monotheism—the worship of one god, the sun, exclusively. His reform perished with his death, and the worship of numberless gods, many of them half-animal, was resumed.

THE HITTITE EMPIRE

In the highlands of Asia Minor developed another great power, until recently a blank upon historic records—the empire of the Hittites, Aryans kin to the pre-Teutons who conquered Italy and Greece. The home of the race was in Asia Minor; here stood their capital, Hatti, whose ruins are found near the modern village of Boghazköi, 90 miles east from Angora. This empire had its beginnings about 2500 B.C. From Asia Minor they passed easily into the center of the Fertile Crescent, and there conquered the various "way states," or civilizations springing up along the one passable way (for ways preceded roads) uniting the Nile and Mesopotamian civilizations.

Between 2225 and 1926 B.C. the Hittites invaded Mesopotamian Akkad. Some centuries later, they conquered throughout all Egypt. When Israel conquered Canaan, about 1350 B.C., the land was described in the Old Testament primarily as a Hittite land. After the conquest, the Hebrews dwelt among the Hittites west of the Jordan, married their daughters, and at times served their god. Uriah, husband of Bath-sheba, David's purloined wife and the mother of Solomon, was a Hittite. The numerous Hittite inscriptions throughout Asia Minor are still undecipherable; but the 20,000 clay fragments from the ruins of the capital, Hatti, are written in Hittite cuneiform writing, borrowed from the Babylonians, and have been translated. The language is not Semitic, nor related to the Egyptian nor Mesopotamian speech. Apparently it belongs to our own Indo-European speech, in spite of its large admixture of novel words.

From Babylon the Hittites early borrowed the coat-of-arms, a lion-headed or double-headed eagle; which they in turn handed across the Ægean, where it spread later throughout Europe, and passed to the United States as the "American" eagle. Hittite mingling and intermarriage with the

Hebrews gave to the latter the prominent aquiline nose so notably a Hebrew characteristic, as Breasted points out. The Assyrian ornamental dado, or slabs of carved figures in relief, came from Egypt into Assyria, through the agency of the Hittites. The empire influenced Greek coinage, architecture, and religion. Its own religion was based partly upon the worship of the great Earth-Mother, akin to the Babylonian Ishtar; and from the Hittites her worship spread to Crete and Greece. A treaty, dating from about 1360 B.C., between Subbiluliuma, king of the Hittites, and Mattiuaza, a Euphrates monarch ruling all Mesopotamia at the time, invoked, among other witnesses, the Hittite gods Mitra, Varuna, Indra, and the Nasatyas, all Hindu or Vedic gods, indicating the kinship between the Hittites and our own ancestors.

With the horse domesticated and yoked to their chariots, and their iron implements and weapons from mines along the Black Sea, the Hittites were for centuries a formidable power. But Greek assaults from the west, including the Greek attack on Troy which grew into the legendary basis of the Homeric epics, added to attacks from the east, ended the power after a thousand years of greatness, about 1200 B.C. The empire disintegrated into small states subject to Assyria; the people vanished from history for almost 3000 years, until modern researches have rediscovered their ancient greatness.

PHOENICIA, ISRAEL, AND PERSIA

Another way state, Phoenicia, with twin capitals, Tyre and Sidon, by 2000 B.C. had become a sea state with a considerable civilization, its elements largely borrowed from Babylon and Egypt. Tyre, on an island half a mile from the shore, was for long regarded as the most impregnable city in the ancient worlds. By 1000 B.C. the Phoenicians monopolized Mediterranean trade, supplying Greece and other coasts of the inland sea with many foreign products from the Orient; and planting colonies, as Carthage on the north coast of Africa, and as far west as Spain. They taught to the rest of the world navigation, colonization, and the phonetic alphabet.

Assyrian kings employed Phoenician workmen to make furniture and metal work for the royal palaces; the Hebrew emperor Solomon employed Phoenician workmen, sent him by his ally Hiram, king of Tyre, to build for him the Hebrew temple at Jerusalem. Their art products reached Greece, and profoundly affected subsequent Greek art, with such symbols as Egyptian flora or plants and hunting scenes, the Assyrian tree of life, and those strange winged creatures of Oriental fancy, the sphinx, the gryphon, and the flying horse. Most important of all was their alphabet of twenty-two letters, representing twenty-two distinct sounds. The Greeks added the vowel signs, altered some consonants, and widened the use of the alphabet. Phoenician *aleph, beth* ("ox," "house"), the first two letters of their alphabet, named after two words beginning with these letters, became Greek *alpha, beta;* and from this our word *alphabet* comes. Largely lacking land military power, the Phoenicians slowly declined from independence.

The most important way state, from its influence on later history, was the empire of the Hebrews or Jews. Their land, now called Palestine, lay near the west end of the Fertile Crescent. The Hebrews were originally desert Arabs, who drifted up against the Canaanites and Hittites, the possessors of the land, between 1400 and 1200 B.C. A smaller group of the Hebrews (called *habiru,* or "wanderers," on ancient inscriptions) had entered Egypt, perhaps at the time of the conquest by their relatives, the Hyksos or shepherd kings; and had subsequently been enslaved. Their heroïc half-mythical leader Moses is said to have led them out of Egypt into Palestine. On the way he detoured to Mount Sinai, near the southern end of the Sinaitic peninsula. This mountain, formerly sacred to the Babylonian moon god Sin, from whom it was named, was now sacred to Yahweh or Jehovah, a god worshipped by the Kenite nomads dwelling around the base of the mountain. Here the Hebrews adopted the new deity, who thereafter was their national god, and is today the preeminent god of Judaism and Christianity alike.

The Hebrews were able to capture only the hill regions, and a few of the weaker cities; the stronger ones, already having had 1500 comfortable years of varied civilization, defied their assaults. The Hebrews on the whole aped and assumed Canaanite and Hittite dress and customs, and intermarried with them; from the Hittites deriving, as we have seen, the distinguishing aquiline nose. By 1100 B.C., Egypt was in a decline, Assyria had not yet menaced the west, Babylon was impotent, and the Hittites had disintegrated. Another way state, the Mediterranean Philistines, who had migrated from Crete to the sea plain southwest of Palestine, formed a warlike group of city kingdoms. Slowly the Hebrews conquered these; just before 1000 B.C. being united under a hill chieftain named Saul, who became their first king.

His successor, David (1000–960 B.C.), a strategic statesman of high rank, completed the amalgamation of Hebrew, Canaanite and Hittite by removing the seat of the kingdom to the ancient Jebusite and Hittite stronghold of Jerusalem. He united south and north Palestine under his rule, and drove off the Philistines. His son, the emperor Solomon, was noted for his thousand wives and concubines, perhaps a pardonable exaggeration of proud later historians,—these spouses being mainly acquired by marriages of state with leading ruling families among his neighbors; and for his activities as imperial merchant throughout the East. After Solomon's death, the north and south of Palestine fell apart. Both were verbally assaulted by reactionary Hebrew prophets, who retained the ancient nomadic sheep-herding Hebrew ideas and appearance. These prophets vehemently urged Israel to return to the worship of the primitive Yahweh, adopted from the Kenites, and to abandon worship of the *baals* or gods of the Canaanites, and with these baals all Canaanite civilized customs.

The heat of this conflict intensified, until the magnificent monotheistic or one-godded conception of the Yahweh of the Old Testament was evolved in their passionate utterances. In 722 B.C., the penalty threatened by the prophets, if Israel refused to heed their warnings, came to pass: Assyria conquered the ten tribes, and carried them into an exile and a subsequent inexplicable disappearance from all history. Southern Israel, or Judea, consisting of two of the tribes, still refused to return to Yahweh worship, in spite of constant threats from the violent reactionary preachers. In 586 B.C. Nebuchadnezzar, Chaldean king of Babylon, destroyed Jerusalem, and carried the people away into Babylonian exile. When Cyrus the Persian conquered Babylon in 539 B.C., he regarded it as shrewd policy to permit the Hebrews to return and build Jerusalem; whereupon he was hailed as the expected redeemer of the Jews by the jubilant post-exilic prophets. Their warlike rulers had been powerless to save the land; the priestly leaders took control, silenced the obnoxious prophets, and narrowed the worship toward that Judaism Hebrews now largely profess. The Hebrews gave to the world the Old Testament, and Judaism; and the New Testament, and Christianity.

The primitive Aryans, who were pasturing their flocks on the great Caspian steppes about 2000 B.C., and who were largely fire-worshippers, with priests called fire-kindlers, broke up about 1800 B.C. into two groups. The eastern tribes wandered toward the southeast, arriving at last at India, where they fought their way to conquest over all the dark natives, and ruled the whole peninsula. They never acquired unity of government; their history is largely the story of petty squabbles between petty chieftains. We shall look at them later. The other group, which kept the name *Aryan* in the form *Iran,* as in the name of the great Iranian plateau, pushed down into the mountains bordering the Fertile Crescent. Among these Iranians two powerful tribes were the Medes and Persians.

By 600 B.C., after the fall of the second Assyrian Empire, the Medes had constructed a great Iranian empire in the mountains east of the Tigris river. Their religion came from a semi-mythical prophet named Zoroaster, who is said to have lived about 1000 B.C.; it consisted in a dualism, a vision of the universe as a conflict between good and evil, typified by the good god of light, Ahura-Mazda (from whose name our Mazda electric lights are named) and the evil god of darkness, Ahriman, from whom the Jewish and Christian idea of Satan was later derived.

The Persians were at first tributaries of the Medes. Cyrus, a Persian king, succeeded in welding the Persians into one nation, and rebelled successfully against the Medes. The trained Persian archers and skilled cavalry, both improvements upon Assyrian fighting methods, swept against wealthy King Croesus of Lydia, in Asia Minor, and defeated him. Belshazzar of Babylon fell next, in 539 B.C., the Persians entering and taking the capital. In 525 Cambyses, son of Cyrus, conquered Egypt. Thus the known world was for a brief space under the heel of a Persian king.

The government was bilingual, or two-languaged, consisting of Persian, with an alphabet of 39 cuneiform or wedge signs, and Aramaic, a Semitic speech which succeeded Hebrew, and at the time of Jesus was the actual speech in Palestine. Cyrus and his successors were the greatest early organizers of imperial government, with satraps or governors of provinces, various travelling imperial investigators who kept an eye on each local satrapy, and magnificent roads joining together the furthest portions of the worldwide Persian empire. Persia's later history, in fatal conflict with Greece, will be told when Greece is reached.

INDIA, CHINA, AND THE NON-EUROPEAN WORLD

The Aryan conquerors of India found there a low Dravidian civilization, of a people who could not write, nor even build with permanence. The tropic luxuriance of the country controlled men toward inertia and a changeless type of living. Trade, sea life, pirate life, were all unknown; the mountains and the jungles walled them from the moving world outside. Serene under the old Brahminic worship and the passive Buddhism that followed, India was startled by the marching and countermarching of the Macedonian Alexander, in the 4th century B.C. A native prince, Chandragupta, inspired by Alexander's example, soon after the Macedonian's death consolidated all India into one empire. The great king Asoka (264–227 B.C.), was noted for his conquests, and his turning from militarism to religion in practice, with an imposing variety of internal reforms.

Soon after the opening of the Christian era, barbarian nomads from the north, the uprooted Sakas, the fierce Indo-Scythians, and the Ephthalites, swept over the land. The Indo-Scythians quartered themselves, under their Kushan dynasty, in the northwest; their greatest king was Kanishka, who widened the empire and reached in trade to China. Empire followed empire in India, with periods of national disintegration in between. The invasion of the savage Ephthalites took place in 470 A.D.; their character can be judged from the favorite sport of their leader Mihiragula, that of rolling elephants down precipitate places, in order to watch their sufferings. In 528 the outraged natives rose against him successfully.

It is needless to tell the varied ups and downs of government, till the coming of the Europeans. The country stagnated, divided into its rigid castes: the priestly Brahmins at the top; the Kshatriyas, or warriors, next; the Vaisyas, or herdsmen, merchants, money-lenders, and land-owners, below them; the lowly Sudras; and, belonging to no caste, the Pariahs. The poison of this artificial division of men still keeps India divided and supine.

China, walled by desert and mountain from the Occident, received the culture of a Mongolian race which pushed down the water-courses of the Hwang-ho and the Yang-tse-kiang rivers in early times. By 2000 B.C. a civilization had come into existence, a blending of this northern alien culture and of a more mixed southern culture, including Siamese and Burmese elements. Constant warfare preceded this mingling. Certain early emperors warred against the mid-Asian Huns from the western frontier. As in the case of other lands, the history is largely legendary at first. The two great dynasties of the feudal period, of the strife between the city states, were the Shang dynasty (1750 to 1125 B.C.) and the Chow dynasty (1125 to 250 B.C.). Toward the end of this period, the feudal princes began to regard themselves as independent, until between the 8th and the 4th centuries B.C. there were more than 6,000 small states, dominated by a dozen more powerful ones. The war-harassed land was in the "Age of Confusion."

At the end of the 6th century B.C. came a hundred years of peace. The northern states of Ts'i and Ts'in effected a combination against the southern state of Ch'u. About 500 B.C. iron weapons came into China, probably introduced by the invading Huns. The last of the Chow dynasty was replaced by the kings of Ts'in; Shi-Hwang-ti, their "first universal emperor," united the land, and constructed the Great Wall of China against Hunnish assaults (214–204 B.C.), a fortification 1,500 miles long. A civil war followed soon afterwards, resulting in the control of the Han dynasty. By 100 B.C. the Chinese had pushed across Tibet and into Turkestan, had come in contact with India, and were conducting a trade by camel caravans with Persia and the west. Shi-Hwang-ti, by shrewd royal vandalism, destroyed the early classics of Chinese literature, holding that the classics of the separate states had a tendency to keep the people apart.

The Han dynasty held China with a firm grip until 220 A.D. The land then declined into general disintegration. Not until the 4th century was order restored, by the very Huns who had hitherto been mere raiders. Settling in northern China and much of Siberia, they united with northern Chinese to overrun the south, and establish the Suy dynasty. Progress multiplied so, from this contact of differing cultures, that for a few centuries China was far ahead of the rest of Europe in knowledge and the arts. Printing, gunpowder, fuel of coal and gas, bridge-building, sea-trading, were among their civilizing inventions.

At the beginning of the 7th century A.D. the Tang dynasty came into power, ruling brilliantly for three centuries. Under Tai-tsung, in 627, the empire reached southward into Annam, and westward to the shores of the Caspian, fringing Persia to the south. The 10th century saw China again broken into struggling fragments; by two centuries later, the Huns again overran all of China but the southern extremities. The Mongol hordes of Jengis Khan easily overran the land; at Kubla Khan's death, one of his empires was that of China, with Pekin as its capital. Its subsequent history will be told later.

In Africa, the Negro, life rendered easy by the rich supply of food, obtainable without man's efforts, had a far slower progress. White men from the north brought in agriculture and the use of metals; those crossing the Sahara probably becoming the ancestors of the half-white Fulas; those going from the Nile's headwaters southward perhaps fathering the Baganda of Uganda.

The East Indies were still inhabited only by backwashes of the isolated Australoid blacks. The islands of Oceania were still uninhabited; their conquest by sea-going canoes came perhaps at 1000 B.C.

In North America, a number of Mongoloid tribes became isolated, spreading southward as hunters of the countless bison of the plains. Independently they later learned the cultivation of maize or Indian corn, and the domestication of the llama in South America. The pre-Inca civilization of Peru reached a high stage of architecture and social organization; their successors, the Incas, persisted in declining splendor till the coming of the Spaniards. The Toltecs in Mexico reached almost as high a stage of civilization; the Aztecs, who succeeded them, survived in imperial brilliance until the Spanish caballeros ended their rule in bloodshed. In Guatamala, the primitive Mayas had a civilization dating at least 1,000 years before Christ. An unexplained migration of the race took place to Yucatan, and here their worship, centered at Cozumel Island, included the building of great stone temples, pyramids, canals, harbors, and fortifications. Internal conflicts, the Toltecs to the north, at least one general pestilence, slowly drained the vigor of the civilization; today, the surviving Mayas are mere degenerate successors of a race once distinguished in knowledge and art.

The Americans progressed to the use of bronze and copper, but not iron; they had gold and silver, and raised stonework, weaving, and pottery, to a high level. The Mayan civilization included the sculpture of elephants, which points to a culture with a contact akin to the settlers of the islands of Oceania. Yucatan had a kind of writing, the Maya script, used for keeping the calendar; otherwise, the American Indians had only a picture writing. There was no link between the Mexican and Peruvian civilizations, when the Spaniards came shortly after 1492. America, by its isolation, in spite of its fine primitive civilizations, was six thousand years behind the old world.

MAN'S FLOWERING IN GREECE

When civilization dawned in Greece, about 3000 B.C., mainland and islands were inhabited by the Ægeans, a branch of the Iberians or Mediterranean race, not closely related to the later Greeks. Predominant in this island civilization was Crete, the link between Egypt and Europe, tied by sea traffic to the East, and as much an Eastern land as Constantinople is today.

The little villages, built of sun-dried brick, received copper from Egypt by 3000 B.C. Later the Cretan metal workers received, from north Mediterranean mines, that mixture of copper and tin called bronze. By 2000 B.C., the Cretans had become highly civilized. At Cnossos, their capital, the kings built temples similar to the Egyptian structures. Cretan art became delicate and exquisite, surviving to the present, especially in the form of great cups of gold, skilfully decorated with dramatic hunting scenes. The island was also in contact with the more backward mainland, where the towns of Tiryns and Mycenae in Argos grew toward Cnossian splendor. The age (1500 to 1200 B.C.), with culture centered at Crete, is usually referred to as the Mycenaean age, since the first modern discoveries of the civilization were made at Mycenae.

About 3000 B.C. an unattractive little New Stone Age village was established by traders at the northwest corner of Asia Minor, known as Troy. By 2500, its rulers had become wealthy commercial kings. Between this time and 1500 B.C., the town was destroyed and rebuilt several times, and had come to control quite a territory around it. A German excavator named Schliemann, from 1870 on, dug persistently down and discovered at Troy the remains of nine cities, one above the other. Schliemann identified the city next to the bottom as Homer's Troy; we now know that this city was a thousand years earlier, and that the sixth city, a Hittite fortress, gave rise to the great Grecian legends. The investigator then proceeded to Mycenae, where his discoveries of the Ægean or Mycenaean culture were even more momentous.

Not long after 2000 B.C. the Indo-European barbarians called Greeks, closely allied to the Teutons, entered upon and overran the peninsula. They drove their herds before them, and carried their families in rough horse-drawn carts. Their front ranks, the Achaeans, pushed southward into the lower half of Greece, the peninsula called the Peloponnesus, and intermarried with the Ægeans there. The settlers could not write; their activities really belong to pre-history. A second wave of nomads, the Dorians, reached the Peloponnesus by 1500 B.C., and conquered the earlier Achaeans and the remaining Ægeans. Then they passed over to Crete, reaching it by 1400 B.C. Unfortified Cnossos fell an easy prey to them; the Philistines, a warrior Ægean tribe, were driven out, some into Egyptian slavery, the rest to found the kingdom below Palestine—a country named from the Cretan Philistines—and to war for centuries with the Hebrews under the judges, Saul, and David.

In the rear of the Greek invaders a more savage horde of their kinsmen followed. In the harsh hill-lands above Greece the Macedonians and Thracians settled; and far to their left the allied Phrygians made their way over the Bosphorus, and established themselves in Asia Minor. All of these Greeks belonged to that vague racial classification called Nordic. Wherever they conquered, the spared survivors were depressed into a subject social caste; not slaves of individuals, but slaves of the state as a whole, as in the case of the helots of Sparta.

The Achaean Greeks, by 1325 B.C., held a strip of Asia Minor; and soon they were embroiled in constant warfare with the great Hittite power lying inland. Hittite records establish that the siege of Troy, in the 12th century B.C., was a historic event, out of which the legends sprang. Soon the Achaeans had extended their conquest over most of Asia Minor. By 1200 B.C., a second wave of Indo-Europeans, including the remainder of the Phrygians and a new group called the Armenians, were invading the Hittite country in Asia Minor. The combined force of their opponents caused the complete collapse of the Hittite empire. With this Indo-European conquest, barbarism had defeated civilization. The Greek language replaced the Ægean, although many Ægean place-names survived; just as many American Indian place names, such as Mississippi, Michigan, Tuscaloosa, Appalachicola, still survive the disappearance of the Mongoloid American Indians. The Greek shepherds settled in the valleys today named Greece after them, and slowly evolved many little city states, their regions confined to the space between the hill-walls that broke up the peninsula into fertile hollowed pockets of land.

The Greeks became civilized, in imitation of the Orientals with whom they came in contact, especially with the trading Phoenicians. The Greek nobles of this early age spent their lives fighting and plundering. Groups of songs grew up, extolling heroes largely legendary; crossing to Asia Minor, these songs were shaped further by professional bards, who entertained the feasts of kings with songs of battle and adventure chanted to the plucking of the harp-strings. Thus the Homeric epics, the Iliad and the Odyssey, may have grown, not the product of one man, but of generations of singers. Greek religion was simple, when the race entered the land; to this they added the Ægean worship of the Earth-Mother, and of other gods and goddesses.

The isolation of the city states prevented one single governmental power from arising in Greece. Yet four powers grew up stronger than the rest—Argos and Sparta on the Peloponnesus, and Athens and Boeotia, the latter headed by the city of Thebes, to the north. The independent nature of the Greeks, encouraged by the geographical isolation of the separate parts of Greece, caused them to supplant the rule of kings by that of nobles; that of nobles by usurping tyrants; that of tyrants, throughout most of Greece, by democracy, or rule of the people (from *demos,* the people, the mob). The invading shepherds, quick to learn, made themselves adept at navigation, and overran and held most of the western coast of Asia Minor.

In Athens, in 594–593 B.C., a young noble named Solon was elected to the office of archon, or ruler, and issued a code of laws greatly aiding the oppressed debtors and the landless citizens. When he voluntarily laid aside his work, a tyrant, Pisistratus, returned, took control, and ruled wisely for many years. The Greek tyrant did not mean an oppressive ruler, but one who seized the power without legal right. The sons of Pisistratus could not hold his power, and in 510 B.C. the last of them was expelled. This date and this fact caused the imitative Roman historians to select the same date, without historical reason, as the date of the expulsion of the Etruscan tyrants of the Tarquin family from the city of Rome. In Athens, other reformers aided the cause of democracy—Clisthenes being preeminent. Sparta also grew stronger, developing, instead of a tyrant or democracy, a rule by two joint kings, somewhat similar to the later Roman system of two elective consuls ruling together. The early Greek philosophers, Thales of Miletus, Pythagoras the Ionian, and others, took significant steps both in science and philosophy, as we shall learn in detail from Book VI: *The Outline of Philosophy.*

Grecian success was suddenly sharply threatened by the onpour of the Persian Empire, at this time in its full glow of conquest. Asia Minor, fringed with prosperous Grecian cities, fell before Persian arms; and Athenian aid to the revolting Ionian cities in Asia Minor turned Persian hatred against the Greeks across the Ægean. In 492 B.C. a Persian army tried the land road, through Thrace, into Greece,—an army guarded by a great fleet. A storm wrecked the flotillas off Mount Athos, and the army was terribly wasted by attacks from the rude Thracian tribesmen. In 490 B.C., a great fleet put out, to cross the little inland sea directly, and capture Greece from the water. When the army of the Persians landed, a tiny Attic force led by Miltiades, at Marathon, not far from Athens, utterly routed the vast Persian armament. The Persian king, Darius, died, leaving to his son Xerxes the subjugation of Greece. While this king was preparing, brilliant Themistocles in Athens succeeded in causing a large navy to be built, in order to stop the overseas menace on the sea.

Meanwhile, the persistent Persians cut a canal across the promontory at Mount Athos, to let their fleet pass this stormy point safely. By sea and land, in 480 B.C., they set out against Greece. At the narrow rocky pass of Thermopylae, Leonidas of Sparta tried, with only five thousand men, to hold back the floodtide of Oriental conquest. He, and all of his followers except one, were killed. Meanwhile, a tempest broke up part of the Persian fleet, and the Greek flotilla engaged in an indecisive fight against the eastern fleet. Persia landed near Athens, and took and burned the city, after Themistocles had removed its inhabitants to the little island of Salamis.

On the height overlooking the bay of Salamis, Xerxes, the Persian king, in the midst of his glittering Oriental court, sat upon his ornate throne, under the serene blue sky of Hellas, expecting to watch the tiny Grecian ships go down in utter defeat, bringing the young democracies of Greece forever under the heavy tread of Persian despotism. The smaller Greek ships faced undauntedly the vaster Persian floating fortresses. They were maneuvered skilfully in the narrow water passes, while the bulkier Persian ships, their movements impeded by the protecting fingers of land grasping into the water to seize them, blundered into each other's paths. There was small chance for retreat. When night fell, the Persian armada had been almost entirely annihilated.

Word came, at the same time, that Gelon, the Grecian tyrant of Syracuse in Sicily, had thrust back the bitter attacks of the Oriental Carthaginians from Africa, against the western Greek colonies in Italy and Sicily. The East and the West had met, and the East retired discomfited.

Step by step the baffled Xerxes withdrew back into Asia Minor, leaving behind him his tried general Mardonius. In a great battle at Platea, in Boeotia, the next spring, with the Spartans belatedly coming to their post as the backbone of

Greek resistance, the Persian armies were routed finally. They retreated, never again to set foot on Greek soil. When Greek met Persian next, the battleground would be the trampled East. The democratic spirit of Greece had triumphed over the progressive yet oppressive imperialism of Persia.

Athens was the home of mental culture; Sparta, of stern military discipline, unproductive of creative achievements in art and thinking. In 468 B.C. the Athenian Cimon crushed the Persian navy in the west; and, rendered magnanimous by this preeminence over the other Grecian states, Athens, under Cimon, agreed to send troops to put down an insurrection in Sparta. The troops arrived; and, through accumulated jealousies, the Spartans discourteously demanded the withdrawal of the valuable Athenian allies. Cimon, discredited at home, was succeeded by the more brilliant Pericles. In 459, under his headship of the Athenian state, the inevitable war with Sparta broke out. A mutually destructive warfare was followed by the Thirty Years peace treaty, arranged in 445—a treaty broken in fifteen years by the opening of the second Peloponnesian war. During all this time, the great age of Pericles saw the highest flowering, mentally and spiritually, that man had yet attained, in the progress of the Greeks in science, philosophy, and the arts, especially sculpture, the drama, and poetry. Athens, elected head of the Delian confederacy of city-states and islands, slowly and tyranically conquered and exploited her allies, planting seeds of bitter resentment. Accordingly, all European Greece not in the Athenian empire united against the arrogant city-state.

Pericles' plan was to recall all the Athenians into the walls of the city itself, and spend the Athenian resources available for war in a great fleet. His ships of war successfully harassed the Spartan seacoasts; but meanwhile the packed humanity within the Athenian walls were visited by a dreadful plague from the Orient, which killed a third of the citizens, including Pericles himself. Athens fell into confusion. Nicias, the weak Athenian commander, made a treaty of peace, in 421 B.C., to last fifty years, which provided that each contestant must give up all new conquests, and retain only old possessions or subject cities. Northern cities which had gone over to Sparta refused to return to Athenian leadership. Nicias was rejected, and the reckless Alcibiades was elected as head of the Athenian state. Contracting a treaty with Argos, he attacked Sparta; yet Sparta did not at once march against Athens. Alcibiades sent a huge fleet against Syracuse in Sicily; the fleet failed to attack promptly, and the general mismanagement caused costly loss to Athens.

Now Sparta, acting on the advice of the treacherous Alcibiades, struck at the heart of Attica. Athens was put in perpetual siege; riots and bloodshed from within further weakened the beleaguered city. Alcibiades switched again, took command of the Athenian fleet, and defeated the Spartans on the sea. He had now the chance to unite all Greece into one nation; but the fickle Athenians, after a slight defeat of his fleet, rejected him, and he voluntarily exiled himself, to die later as a victim of a Persian dagger. In 405, at the little Goat Rivers or Aegospotami, the Spartan commander Lysander surprised and captured practically the entire Athenian fleet. Athens' last resource was gone; in a few months she surrendered to Sparta, this act marking the end of the brilliant Athenian empire.

Under Spartan leadership, Grecian democracy steadily declined. Thebes and other cities rose in revolt, under Epaminondas and Pelopidas; and at Leuctra, in Boeotia, in 378 B.C., the Spartans were overwhelmed. In 362, Epaminondas himself fell in a final battle with Sparta at Mantinea, in a vain endeavor finally to establish Thebes as the leading Greek state.

MACEDONIA HELLENIZES THE WORLD

Two years later, in half-barbarous Macedonia north of Greece, a king, Philip, succeeded in grasping all power into his hands. Realizing the disorganized condition of Greece, he called upon the Hellenic cities to surrender to him. At the battle of Chaeronea, in 338 B.C., he decisively vanquished the rest of Greece, and commenced freeing the Greek cities in Asia Minor. His wife, Olympias, a restless, evil princess from Epirus, a half-Greek land west of Macedonia, made much trouble upon the marriage of Philip to a second wife, Cleopatra, a Macedonian; she set her brilliant epileptic son Alexander against his father, and then fled the land. In 336 B.C., in the festivities attending the marriage of Philip's daughter, he was stabbed to death by conspirators. The subsequent conduct of Olympias indicated that she was responsible for the murder. She at once reappeared in Macedonia, and gave as much honor to the funeral of the assassin as to that of her husband; and, when her son Alexander departed for a brief period, she had the newborn child of Cleopatra killed in its mother's arms, and then had the rival wife strangled.

Alexander of Macedon, who succeeded his father, proved a stronger man than the vigorous father had been. His teacher had been the great philosopher Aristotle; yet, after all, the squabbling Greek states so far knew him merely as a young prince, who must prove his ability. Thebes revolted; Alexander, marching quickly, took and totally destroyed all the city, sparing only the house of the lyric poet Pindar. Whereupon the Greek states, except Sparta, formed a league, and elected Alexander as leader and general. It was Persia, the scotched but far from killed serpent, which Alexander was aiming against; the beginning of this plan was the completion of his father's design of freeing the Ionian cities in Asia Minor from Persian rule.

Alexander entered Asia Minor, and at the River Granicus, in 334 B.C., scattered the far greater armies of the western Persian satraps. Alexander himself, only twenty-two years old, placed himself at the head of his troops, with utter confidence exposing his body to the perils of warfare. Persia fled before him; Alexander marched southward, and one by one freed the Grecian cities forever from the Persian yoke. By the Gulf of Issus Alexander, in 333 B.C., for the second time met the Persians, under the personal command of Darius III. The battle resulted in a second tremendous victory; and the Persian king, collecting his retreating forces, sent a letter to Alexander offering peace, with the Euphrates as the dividing line between the two powers: all Asia west of the Euphrates to be ceded to the Macedonian.

On the one hand, his trusted old counsellors urged acceptance of the flattering offer; on the other, Alexander's imagination was kindled by visions of world conquest. Ambition won; Alexander continued the war. He marched to the island city of Tyre in Phoenicia; even after a break was made in the pier connecting this to the mainland, the siege lasted for seven months. The city fell, and Egypt soon followed. The Macedonian conqueror marched back into Mesopotamia, crossed the Tigris, and in 331 faced the Persians on the field of Arbela. The backward Persians for the third time were utterly defeated; and in a few days Alexander was ruling the world from his palace in Babylon. Darius was treacherously stabbed by an attendant. The Nile, the great twin rivers, the Fertile Crescent, all of Greece, were in the hands of the young Macedonian, who hardly five years before had entered Asia for the first time.

There was still much to do. The conqueror marched through Persia, at the tomb of Cyrus near Persepolis with his own hands setting fire to the Persian palace, as the Persians had once done to Miletus and to the temples on the Athenian Acropolis. One story tells that he repented, and had the flames extinguished before great damage was done; another, that he watched until the building had gone swiftly where time in the end would have worn it.

For six years Alexander's weary soldiers looped their marches throughout the Iranian plateau, north across the Oxus and the Jaxartes, south across the Indus and the frontiers of India, and into the valley of the Ganges, where at last the tired murmurs of his soldiers forced his return. Seven years after he had left Babylon, or in 323 B.C., the conqueror returned. During his march he had founded 70 Greek cities named Alexandria, the most noted being the one in Egypt. Dealing with problems of government; securing data for further scientific investigation by his old teacher Aristotle; spreading Greek culture throughout the Orient; marrying Roxana, an Asiatic princess, while his nobles had to marry other Asiatic princesses, to mate the West with the East; planning the westward conquest of Carthage, Sicily, and Italy;

dreaming vast dreams of having the promontory of Mount Athos carved into an immense statue of himself, with a town of 10,000 people located in the statue's right hand; having himself elevated to godhead in Egypt, and hailed as the son of Zeus-Amon; executing his most intimate Macedonian friends, who plotted against this presumptuous godship—thus was the great incarnation of energy occupied. At the end of a drunken debauch, he fell sick, and died in 323 B.C. after a brief illness. He was 33 years old, and had reigned thirteen years.

His empire fell apart at his death, and his successors warred bloodily for some share of the power that fell from his relaxed hand. At the end of the strife, Antigonus held Macedonia, and most of Greece; Seleucus, another of Alexander's generals, controlled Asia; Egypt was ruled by Ptolemy, one of the shrewdest of the dead conqueror's Macedonian leaders. Ptolemy and his successors regarded themselves, not as Greeks, but as inheritors of the autocratic power of the pharaohs. The example of this ancient Oriental absolute monarchy finally supplanted the democracies of Greece and Rome.

Seleucus founded the great city of Antioch, named after his father, as his capital, and built up the empire of Syria, which became a vigorous rival of Egypt. Antigonus, in the fragments of the empire around Macedonia, suddenly found himself menaced by those Indo-European barbarians called Gauls or Celts, who sacked Rome in 390 B.C. and a century later were ravaging down the Balkan peninsula, reaching the oracle of Delphi in 280 B. C., and penetrating Asia Minor, where a group of them gave their name to the country, which was thereafter called Galatia. In 277 B.C. Antigonus II defeated these Gauls in Thrace and Macedonia.

The cities of Greece formed two leagues, largely directed against the Syrian Antigonid power; these being the Achaean League south of the Gulf of Corinth, and the Aetolian League to the north. Sparta refused to join the former league, and its democratic king, Cleomenes, repeatedly defeated the league forces. The Achaeans called on Macedonia for help against the Aetolians; Cleomenes was crushed, and the

Achaeans lost their own liberty to Macedonia. Aetolia at length appealed to Rome for aid; and she was swallowed up in the rapacious maw of the bloody mistress of the West.

THE RED-HANDED ROMAN REPUBLIC

Geographically, the peninsula of Italy differs greatly from Greece. Two vast plains stretch southward, parted by a range of mountains. The north is almost harborless, the southern extremity full of sea-havens. Thus at the southern end sea marauders, like the Greeks, could easily settle; and from the easy northern passes land raiders could come in. Where they met, we should expect a civilization to develop; and they met logically near the city of Rome, on the Tiber, the only navigable river in Italy. By 2000 B.C., the lake-dwellers of the New Stone Age Switzerland pushed through the Alpine passes, and occupied the Italian lake district. The city of Venice is a surviving example of how these lake-dwellers once built their little wooden houses on piles in this same region.

When they reached Italy, these peoples had already received the use of metals from the East. Thus copper (Latin *cuprum*) is named from the island of Cyprus, earlier named *Cuprus,* whose rich mines supplied the Mediterranean shores with copper from early times. Our *bronze* is probably derived from the name of the city of Brondisium (later *Brundisium,* now Brindisi), a foreign settlement on the Adriatic side of the extremity of Italy.

Next after this invasion, the western end of the Indo-European migration, which had overflowed Greece in the Achaean and Dorian floods, was attracted by their fertility to the Italian plains. The great Italic tribes were the chief of these, and their drive ultimately reached into Sicily. Soon roving sea raiders, probably from Asia Minor, named Etruscans, landed on the western slopes, and took and held the section called after them Etruria, as early as 1000 B.C. The Phoenician colony of Carthage, which had become an empire of sea raiders, attacked Sicily, and held half of it. To the south, the Greeks landed and formed many cities, of which the greatest were Croton and Sybaris on the mainland, and Syracuse on Sicily. This section of Italy was then called *Magna Graecia,* or Great Greece; and from Sybaris, then with Croton the most luxurious Grecian cities in the world, we get our word *sybarite,* meaning one who lives a life of bodily ease. By the year 400 B.C. Dionysius, tyrant of Syracuse, had built up a strong power; but his successors let it weaken.

Along the Tiber was the small Italic tribe of Latins, who had named their land Latium. Nearby was Alba Longa (the "long white city"), the chief town of the region. By 1000 B.C. Rome was a small village of a few Latin families, some Etruscans, and a few overseas strangers. By 800 B.C., the strong Etruscan city-states held most of northern Italy. Perhaps as early as 750 B.C., an Etruscan prince crossed the Tiber, drove out the last of the Latin chiefs, and took possession of Rome's stronghold, the Palatine Hill. Alba Longa was soon defeated, and Rome became another Etruscan city-kingdom. For two and a half centuries the Etruscans ruled the town, although the people continued predominantly Latin, speaking the Latin tongue.

These kings drained the marketplace, or Forum, which had been subject to frequent flooding; their ancient sewer, the Cloaca Maxima or Great Sewer, still remains. On the Capitoline Hill they erected a temple to Jupiter, the state god—compare the various names for god the father, the Greek *Zeus-pater,* Latin *Deus-pater* and *Jupiter,* and Sanscrit *Diu-pitar.* The religions of all the ancient cultures will be considered more in detail in Book V: *The Outline of Religion.* The Greeks profoundly modified the local religion, and contributed certain elements of language and culture.

About 500 B.C. the Etruscan kings were driven out of Rome; leaving the nobles, or patricians (literally, "men with fathers") in charge. No one of their number was strong enough to hold the power; by a compromise, somewhat as in the case of Sparta with its joint kings, Rome decided to have two consuls, or kings for a year, elected annually. The patricians were the descendants of the three conquering tribes, the Roman Latins, the Etruscans, and the Sabines, who, legend says, settled another low hill in Rome, the Quirinal. The plebs consisted of transported clans from conquered cities, refugees, and traders; at first, these were not citizens. Some grew rich; and wealth resents being forbidden a share in the law, the religion, and the politics of its home city, as well as being banned from intermarriage with members of the patrician families. The struggles of the plebs to gain these rights constitute the early political history of Rome.

Patrician society was organized into families, clans, and curias, or tribes. The father was owner and ruler of the family, its priest, judge, and king. He could sell or kill wife, unmarried daughter, grown son, or his son's wife; no appeal lay from him to any higher judge. This was the law; the practice grew milder. The families were grouped into 300 clans; the clans into 30 curias. Patrician government had at first three parts—king, senate, and assembly. The senate was made up of the 300 heads of clans; the assembly, of all the patricians gathered together—a real patrician democracy. Constant warfare of Rome against its neighbors, at first restricted to patrician fighters exclusively, at length required the aid of the plebs; and they, as they had to fight, demanded also the right to vote. A new assembly, the assembly of centuries, or military companies of 100 men each, replaced the old assembly of curias; though, by political juggling, the patricians still held more than half of the voting strength. A third and more democratic assembly, the assembly of tribes, was next demanded and gained by the insurgent plebs.

In 497 B.C., according to the later historian Livy, the conflict broke out openly. The plebeian army went on a "general strike," marching three miles away from Rome, and declared that they would build themselves a Rome of their own, if their demands were not met. Patrician concessions gained their return; and patrician guile and force put to death such popular leaders as Genucius, Spurius Cassius, Spurius Maelius, Marcus Manlius, and Appius Claudius. Claudius, in 451 B.C., joined in the plebeian demand for written laws. He was not only murdered, but his memory was blackened by patrician ingenuity, as in the case of the baseless legend of his attempted seduction of the plebeian maid Virginia, and her father's high-spirited sacrifice of his daughter's life rather than of her body's usance.

The first secession of the plebs gave them the right to have tribunes, or defenders of the masses, whose "Veto!" meaning "I forbid!" could stop the decree of any magistrate. In 450 B.C. the patricians were forced to grant written laws, put down in a form as bloody and oppressive as the pre-Solonian laws of Draco in Athens. The Decemvirs, or group of ten men who wrote down the laws, did not reform them; but, at least, these laws were at last in an intelligible form, accessible to all, and affected patrician and plebeian alike. Slowly the plebs won the additional rights of holding office, of intermarrying with patrician families, of eligibility to the consulship and such religious offices as that of censor; and they won also a lightening of the loads of debtors, and a restriction of the hitherto unlimited right of landholding. The invasion of the Gauls or Celts in 390 B.C. delayed the victory, but by 300 B.C. the fight was wholly won.

For the 60 years after 500 B.C., Rome fought for her life against the Etruscans to the north. Etruria lost, through the destruction of its fleet by the Syracusans of Sicily, about 474 B.C., and by the attack of the Gauls, lasting for 100 years, which fell heavily here before its weight touched Rome. In 396 B.C. Rome had fought her way to the headship of the Latin League, and had destroyed a dangerous rival town, Veii, not far away. In 390 B.C. the Gauls at last reached Rome, sacked the city, and held it for seven months; but a plague of malaria ravaged the Gallic army, and on a payment of ransom Rome was relieved of their ravaging presence.

A short war made Rome again mistress of Latium; the Campanian cities to the south became her tributaries; and in 338 B.C. the last Latin revolt was crushed. Rome's governmental shrewdness appeared in the fact that she made separate treaties with each city, forbidding each to have intercourse with the others. Her policy always was to divide her enemies, and crush or conciliate them separately. Upland Samnium still menaced the Tiber power. In 321, at the battle of Caudine Forks, Rome lost abjectly. Soon afterwards, she broke her pledge of peace by clever trickery, and fought to a conquest in 290 B.C. Ten years later, she took over the Greek cities in the south, defeating last of all Tarentum, which had as ally the famous king Pyrrhus of Epirus in Greece. Pyrrhus almost won, with his formidable fighting Asiatic elephants; but his "pyrrhic victories," or victories so costly that they were worse than defeats, were terminated at the battle of Beneventum, in 275 B.C., which was won by Rome, now at last the ruler of all Italy.

Roman citizens were now in three classes:

1. Inhabitants of Rome.
2. Roman colonies planted throughout Italy; and
3. Members of conquered cities admitted to full citizenship.

The majority of the citizens now lived outside of the city itself. Below these, with lesser rights, were

4. Latin colonies.
5. Italian allies.
6. Prefectures, or constantly revolting towns disciplined by withdrawal of all right of self-government.

The great system of Roman roads, tying the Roman world into a spider web whose heart was Rome itself, was now commenced. The Roman ideal was a stern stoic one, demanding simplicity of life, utter patriotism, and the harsher virtues of military life. Rome was now one vast armed camp. Thus integrated into dreadful efficiency, she turned to face the world, and to beat it to its battered knees.

STEPS TOWARD AUTOCRACY

The great autocratic trading town of Carthage, a Phoenician colony, dominated, from its splendid harbor on the northern coast of Africa, the entire western Mediterranean. There were three wars against Carthage, called the Punic Wars, the word being derived from *Phoenician*. The first of these, lasting from 264 to 241 B.C., brought Rome's compact land army face to face with the wealth and the navy of Carthage. Rome, always quick to learn from an enemy, built a navy, and under Regulus invaded Africa successfully. Carthage, under its general Hamilcar, surnamed Barca or "The Lightning," destroyed four successive Roman fleets, and failed only before the fifth. The peace treaty gave Sicily to Rome; and, before the next war broke out, while Carthage was baffled by a bloody revolt among her mercenaries or paid troops, Rome annexed Sardinia, Corsica, swept the Adriatic Sea free of the Illyrian pirates, and absorbed Cisalpine Gaul, or Gaul this side of the Alps.

The second war, extending from 218 to 202 B.C., saw Carthage commanded by brilliant Hannibal, son of the dead Hamilcar. Hannibal left his siege of the Greek colony of Saguntum in Spain, now allied with Rome, and marched in five brief frigid months across the Pyrenees and the unknown passes of the icy Alps, startling all Italy by appearing in Cisalpine Gaul with a surviving fourth of his army, 26,000 heroic shadows of men. He fell upon the first three Roman armies that faced him, and annihilated them.

In the emergency, Quintus Fabius Maximus was named dictator, or sole war lord, replacing the two peacetime consuls. He was called *Cunctator,* the Delayer, because of his "Fabian policy" of postponing actual conflict, and thus wearing out Hannibal. Rome murmured hot-headedly against the inactivity; Fabius was removed, and a Roman army of 90,000 was butchered at the bloody field of Cannae. Hannibal tried to wean Rome's allied towns away from her, with only slight success. Hasdrubal, the Carthaginian leader's brother, arrived across the Alps with 56,000 allies. Rome fell upon him at the Metaurus River, and destroyed him and his army. The first news Hannibal had of his brother's arrival in Italy was when the ghastly head of the dead Carthaginian was flung with brutal contempt across the lines into his camp.

Rome carried the war into Africa, in 202 B.C. Carthage had to recall Hannibal. There, in Africa, the great general suffered his first and only defeat. Carthage was forced to surrender Spain; her war elephants; her navy, except for ten ships; a huge indemnity; and even the right to wage war without Roman consent. After some years, Carthage was ordered to surrender Hannibal himself to Rome. The defeated conqueror fled to the East, and in the end took his own life, to avoid falling into Rome's merciless hands.

Then Rome permitted Massinissa, Prince of Numidia, to prey upon stripped Carthage, without allowing retaliation. Roman commissioners reported with envious insistency that Carthage was thriving again; bitter Cato, the Roman orator, closed every speech with *"Carthago delenda est!"*—Carthage must be destroyed! And so Carthage was destroyed, in the typical callous Roman method, combining treachery and cruelty. First 300 Carthaginian boys were demanded as hostages, and were sent to Rome. At the Roman command, Carthage had to dismantle its walls and strip its arsenals, sending Rome 3,000 catapults or artillery slinging-machines, and 200,000 stands of arms, with other vast military supplies. Next, all the shipping was demanded, and had to be surrendered. With her rival powerless, Rome now demanded that the city be destroyed, and rebuilt ten miles inland—ten miles away from that seaway that was at once the mother and the breath of life to the stricken Oriental power.

Carthage, at this late fatal hour, blazed up into despairing courage. Women gave their hair to make ropes for new catapults. The temple fittings were pounded into emergency arms. Carthage, unarmed as she was, fought back Rome for four hellish years. At last the pounding legions forced the hastily rebuilt walls. The city was pillaged, and burned to the ground; its site was plowed up and sown with salt, in order to make it perpetually barren; and the very ground on which it stood, in 146 B.C., was cursed with a dreadful and endless curse.

Rome, with this rival done to death, turned to her eastern campaigns, which had begun in 214 B.C. Macedonia was defeated in three great wars; there was no Alexander to torch Greek hearts into invincibility. Great Antiochus of Syria was faced and conquered. By 190 B.C., protectorates were set up over the realms of Alexander's successors; by 146 B.C., these protectorates had altered into provinces. This same year the Achaean League fell before Roman might; and

Corinth was burned, and its site cursed, while all of its people were murdered or marketed into slavery. By 133 B.C., the king of prosperous Pergamum, a resplendent Asia Minor fragment of Alexander's empire, willed his domains peacefully to Rome, to become the Province of Asia. In 246 B.C., Rome had been one of five world powers—Syria, Egypt, Macedonia, Carthage, and Rome: a hundred years later, she was the sole great power in the Graeco-Roman world.

A century of weakening revolutions followed, due to the evils that come with military conquest. Even a glorious war tends to corrupt society: morals slacken, and the poisonous chasm between wealth and poverty grows greater. The poor fight with their bodies, which too often pay war's red price: the rich fight with their wealth, which has a shrewd way of multiplying itself with increased rapidity during an hour of national peril. The comparative economic equality of the early Romans was replaced by a Rome of the utter poor and the utter rich. The utter poor have no manhood, no patriotism, nothing in life to fight for; the utter rich are weakened by the cringing service of their slavish servitors, and discover too late that, in time of danger, they cannot buy patriotism, and nobility, and self-sacrifice, with all the red gold in the world. The Second Punic War cost Rome 100,000 lives—a ghastly hemorrhage of human beings that weakened the Tiber empire permanently. Hannibal's ravages destroyed the Italian farmer; he never reappeared. The agricultural yeomen were gone, the city masses had crumbled into a starving, propertiless rabble. Provinces were "farmed" or sold to the highest bidder, who could mistreat the distant citizens as he saw fit, so long as he paid his price for the privilege of squeezing the taxes, and his own share above this, out of the oppressed and conquered.

How were the starving rabble, the utter poor, to be kept quiet? They had become human beasts, such as the Paris slums knew before 1789, such as many a great city knows today. By amusements—the bloody gladiatorial games, in which murder was organized as a sport, with men and beasts killing one another to the cackles of the sodden spectators;

and by free food, which further pauperized the already too poor. Two noble brothers, the Gracchi, between 133 and 124 B.C., sought to limit the holding of land, to provide corn or grain at half price, and to enact other reforms. Both were murdered by the oppressing rich. Marius, a rude Volscian laborer, and his aristocratic lieutenant Sulla, gained fame fighting in Africa, and against the great Germanic invasion of Cimbri and Teutones from the north, these tribes being defeated in 102 and 101 B.C. The two Roman butchers turned against one another, and plunged the city into the horrid blood-debauchery of civil wars. Turning their killing outward, they defeated Mithridates the Great of Pontus, in the East; then returned to kill at home by what was called proscription, or publishing lists of wealthy Romans whom any man might murder for a reward. Sulla abdicated his power, to return to his less bloody debaucheries, and to die a private citizen. A greater than he was about to step upon the reddened stage.

When Sulla died, Pompey, the mediocre-minded general, and Crassus, a shrewd millionaire, inherited his power. They were not wise enough to unite their strength, to grasp the whole rule. Pompey scoured the Mediterranean of the Cilician pirates, and crashed triumphantly over all opposition clear to the Euphrates River. In his triumph, 324 princes walked captive behind his chariot; and banners proclaimed that he had defeated twenty-one kings and 12,000,000 people. The crown again lay within his grasp; again, in his timidity, he let the chance slip.

THE WEAKENING ROMAN EMPIRE

Julius Caesar, one of the great geniuses of history, and at the same time an effeminate sensualist whose nickname was "the husband of all women," commenced his earth-shaking career as a democrat. The unpopularity of this party, following the failure of the democratic conspiracy of dissolute Catiline, a conspiracy punctured by the eloquence of Cicero, sent the young Caesar into retirement in Spain. At his suave suggestion, he, Pompey, and Crassus—brains, military power, and wealth—joined themselves unofficially into the first triumvirate, or rule of three men over Rome. The combination was irresistible; and, in the end, the fruits of the invincible alliance went to the brains, which were embodied in Caesar.

Caesar chose the proconsulship of warlike Gaul, the region stretching vaguely northward to the North Sea and Britain. For ten years he abandoned Italy, crushing great revolts, extending the Roman boundary to the Rhine, and conducting two punishing expeditions into Britain. Pompey had been allotted Spain, which he ruled illegally from the city of Rome; Crassus had the East, which demanded his life in toll, in a battle against the huge, sprawling Parthian Empire, successors of the Persians, a power stretching from the Euphrates to the Indus.

It was Pompey or Caesar now; and civil war once more broke out. Caesar with one indomitable legion crossed the little river Rubicon. Joined by his other legions, he swept through Italy, took all Spain, and defeated Pompey in Thessaly, in northern Greece, at the battle of Pharsalus, in 48 B.C. The defeated general, fleeing to Egypt, was murdered as he landed by a Roman officer.

Caesar, following his defeated rival to Alexandria, was soon infatuated by the brilliant seductiveness of Cleopatra, the young queen, last ruler of the Macedonian Ptolemies who had reigned over the Nile lands bloodily and weakly for nearly 300 years. By her he had a son, Caesarion, known in Egyptian records as the 16th and last Ptolemy. Caesar brought the Nile charmer back to Rome with him, as his unofficial wife, quartering his legal wife Calpurnia in one of his many palaces. In this hour of triumph, his policy toward all Rome was reconciliation. Reforms followed one another with bewildering speed: a wise bankruptcy law, a commission to distribute land, a discouragement of slavery, far-seeing colonization including the rebuilding of cursed Carthage and Corinth, a reduced taxation, a census, a codification of the laws, a revised coinage and calendar, a rebuilt Forum, a great public library—these and many other reforms establish him, in his public activities, as one of the great statesmen among men; as, in private life, he was one of the great wholesale lovers. He placed tall fair-haired Gauls in the senate beside the doddering Italian aristocrats, and by this contact of alien cultures vastly improved Roman legislation. At the height of his power, when he was on the eve of proclaiming himself king, at the insistent whispered urging of his beloved Cleopatra, he was stabbed to death by conspirators led by Caius Cassius and Caesar's dear friend Marcus Brutus. This was on the Ides or middle of March, in 44 B.C.

It took fourteen dreary years of civil war to restore peace to Rome. Cassius and Brutus were opposed by the second, a legalized, triumvirate, consisting of Marcus Antonius, or Mark Antony, the orator; Octavius Caesar, the sickly grand-nephew and adopted son of Julius Caesar; and one Lepidus, a dull governor of Gaul and Spain. A new proscription, or murder list, removed Cicero and many noble Romans; and at Philippi, in 42 B.C., Brutus and Cassius were defeated by the army of the triumvirate, each of the losing generals committing suicide.

Lepidus was pushed promptly aside, and Octavius and Antony proceeded to fight for control of the Roman world. Antony by now had become the lover of Cleopatra, by whom he had two sons and a daughter. At Actium, off the coast of Greece, in 31 B.C., Antonius' fleet, weakened by the flight of Cleopatra's flotilla midway of the battle, was routed by the ships of Octavius. Antony fled to Egypt, where he killed himself; and Cleopatra, after a final hopeless attempt to win the love of the cynical pitted-faced Octavius, put the asp to her breast, and died as a queen should.

Octavius took for himself the name Augustus, a term usually reserved for the gods; returned quietly to Rome; and, after four years of shrewd political maneuvering, laid down the office of triumvir, which had become a sole dictatorship, and announced that the republic had been restored. This was merely one way of stating that the Roman Empire was firmly established, with himself in utter control. Republican forms were strictly followed; yet to the title Augustus the name of Imperator, or supreme military commander, was added; from this our word *emperor* comes, just as *kaiser* and *tsar* derive from the word *Caesar*. For the forty remaining years of his sour life he labored only to strengthen the northern Roman frontiers, and in invaluable internal improvements. In literature, the period is called the "Augustan Age," and marked the golden age of Roman culture. Of Rome he said, "I found it brick, and I left it marble."

During his reign, in a date historically computed to be 4 B.C., a son named Jesus was born to a Jewish woman named Mary, espoused wife of Joseph, a carpenter of Nazareth in Judea. So the Christian world believes; and, based upon the authority of the Christian New Testament, tells of his preparatory years, and of his kind ministrations to the poor, the sick, and the oppressed of Judea; and of his ultimate crucifixion by the Jewish priestly power, with the permission of the Roman governor. Contemporary history is silent about his birth, life, and death. Within a century after his death, the name of the sect which hailed him as god begins to creep into Roman history; we shall learn much of it later.

At the death of Augustus, the senate decreed him divine honors. This was in 14 A.D. (meaning *Anno Domini,* or year of our Lord). His stepson Tiberias, a stern, morose, suspicious, yet able ruler, followed him. Tiberias angered the Roman populace by stopping the gladiatorial games, and by abolishing free grain. At his death in 37 A.D., his grandnephew Caligula, a promising youth, who evolved into a capricious madman, succeeded him. Caligula is remembered for his wish that the Roman people had one neck, that he might sever it. He proposed to the senate to bestow the consulship upon his horse; which might, indeed, have made a more intelligent ruler than his depraved master. After four years, the emperor was slain by officers of his guard, amid general rejoicing.

Claudius, the uncle of Caligula, who ruled from 41 to 54 A.D., was timid and gentle; and his rule, through two freedmen, was saturated with graft. He extended the citizenship to provincials, and bettered the lot of slaves. When he was poisoned, his stepson Nero ascended the throne, at the age of sixteen. During his reign of fourteen years Nero put to death his mother; his tutor, the philosopher Seneca; his half-brother; and many wealthy nobles. Like Caligula, he entered the lists as a gladiator; and he is blamed for the fire which destroyed Rome during his reign. He accused the strange new sect of Christians of this crime, and followed this up with the first persecution of the followers of the Nazarene. Victims, tarred with pitch, were burned as living torches in the imperial gardens, to light up the revelries and debaucheries of the court. The emperor committed incest, and publicly married a man. Terrified by a popular uprising, he had one of his slaves end him with a sword.

The year 69 A.D., which followed, was one of wild confusion. The Spanish legions elevated their general Galba to the imperial throne; he was ousted by Otho, leader of the emperor's guard; he, in turn, by Vitellius, commander of the Rhine legions. Out of the turmoil the seasoned warrior Vespasian, from Syria, emerged as emperor. He was in every sense a man. During his reign occurred the siege and destruction of Jerusalem, in 70 A.D., the emperor's son, Titus, commanding the attack. Titus ruled after his father for two years, and was succeeded by his brother Domitian, whose general Agricola completed the conquest of Britain clear to Scotland. After a second persecution of the Christians, the emperor was assassinated by members of his own household.

The Antonine Caesars, or "Good Emperors," who followed, were largely sons of the provinces. Nerva, a Spanish senator; Trajan, another Spaniard, under whose rule the empire reached its greatest extent; Hadrian, a third Spaniard, who built the great Roman wall in Britain; Antonius Pius, and his nephew, Marcus Aurelius, the philosopher, gave Rome almost a hundred years of admirable rule. Commodus, son of Marcus Aurelius, was a Caligula and Nero combined, who was ultimately poisoned and strangled by order of one of his mistresses.

THE BARBARIANS COME

The next hundred years, from 192 to 284 A.D., the period of the "Barrack Emperors," saw the imperial throne the spoil of revolt, and even of auction sale. Among the better rulers were Septimius Severus of North Africa, Alexander Severus of Syria, Claudius II, a great general, and his successor Aurelian, an Illyrian peasant.

The third century was marked by a renewal of the barbarian attacks. Asia, the womb of the nations, began to disgorge her hordes of barbarous Teutons and other races, seeking food westward, and pushed on relentlessly by the even fiercer Mongolian Huns. The Moors were on the move in Africa; the Parthians again menaced the Euphrates; Tartars, Finns, Slavs, followed Germans in their onslaughts upon the Danube. The Persian Sassanidae kings replaced the Parthians, and threatened the east. In 250 to 260 A.D. their armies imprisoned the emperor Valerian. The Alemanni crossed the Rhine; Franks swept over Gaul and Spain; Goths seized Dacia, and raided the Balkan provinces. The crumbling had begun.

Two flaws had developed in the imperial government: its primitive machinery, and the uncertainty regarding the succession to the throne. Diocletian, who ruled between 284 and 305 A.D., a stern Illyrian peasant, introduced the idea of "partnership emperors," in which two Augusti or emperors ruled jointly over Rome, each with a Caesar, or chosen heir, to aid his efforts. The imperial court became Oriental in its unrepublican magnificence.

Out of the turmoil over the succession, Constantine the Great, who ruled from 312 to 337, took the power. He definitely accepted Christianity as the religion of the empire; although in fact he Christianized Rome less than he Romanized Christianity. Barring the brief return to paganism under Julian, his noble cousin and successor, the empire remained Christian in name thereafter. The capital was removed to the ancient town of Byzantium, which was renamed Constantinople, and rebuilt with great magnificence. Christianity, early in its control, retaliated for its prior persecutions by stamping out in bloody massacres all other worships in the empire.

The Teutons, gloomy barbarians at about the stage of culture of the North American Indians in 1492, now began to overwhelm the weakened empire. In 376, the West Goths or Visigoths crossed the Danube, fleeing the dreadful Huns at their rear. They defeated and slew the emperor Valens at the battle of Adrianople, and in 410, under their leader Alaric, they sacked the city of Rome itself. Marching on to Spain, they drove out the Vandals, and set up a state which lasted for three hundred years, and until the Moorish conquest.

Before Rome was sacked, the Rhine frontier cracked and gave way. Burgundians and Vandals came first, the former settling and renaming southeastern Gaul, the latter occupying Spain. On their ejection by the Visigoths in 414 to 427, these Vandals withdrew into Africa, and set up a new Teutonic kingdom with its capital at Carthage. In 455, under Geiseric, these terrible untamed raiders sacked Rome, ravaging the city for fourteen days, and sending its plundered treasures back to Africa in ships loaded with spoils. Carthage was at last revenged.

The Franks alone of the Teutons spread by outward expansion, instead of by migration. Britain was invaded and conquered by Jutes, Angles, and Saxons from the mainland; England is named from these Angles, and the counties of Sussex, Wessex, Essex, and Middlesex from the South, West, East, and Middle Saxons. The seven little kingdoms these invaders founded did not control the eastern half of the island until 600.

A confused mass of Huns, Tartars, Finns, and Avars, called collectively Turanians, pushed into Europe from the steppes of Asia. Attila, the terrible Hun, burst upon Rome. At the battle of Chalons, in 451, Romans and Teutons turned back the Hunnish tide, with a loss to the Huns of 300,000 men. Pope Leo turned the vanquished hordes from Rome, and here the fever took its toll also. Thereafter, German overlords ruled Italy—Rikimer, Orestes, Odovaker, the last of these deposing the last emperor of the west, Romulus Augustulus, in 476.

The East Goths, or Ostrogoths, threw off the yoke of the Huns, and in 498 reconquered Rome for the emperor of the East at Constantinople. The great lawgiver Justinian was then emperor; his generals Belisarius and Narses for twenty years ravaged Italy, seeking to recapture Rome, and in this war destroyed the rising greatness of the peninsula. The Goth, Totila, in 546 again sacked the city. In 568 the Lombards established themselves in the Po valley, which has since been called Lombardy. The Lombard held the north, the empire held Rome and the south. Rome was not united again until 1870. With this division, the period of Rome as mistress of the world had ended.

The story of man began in the intense sunlight of rending savage days during the harsh Ice Ages. We have seen this strange self-conscious traveller stumble slowly up the prehistoric aeons, the sickening centuries of oppression under the trampling early empires: followed by the bright hour of Greece, and the bloody years of Rome's might. Now a shadow is cast over the story, as man passes into the long eclipse of the Dark Ages. But shadows, in the end, yield to the light: and out of the dimness of medieval stagnation the story will lift again into the lightening murk of the present, and in the end look clearly toward the long delayed sunrise of the future.

ADDITIONAL READINGS

PREHISTORIC MAN. *Men of the Old Stone Age,* by Henry Fairfield Osborn (New York, 1915), is a thoroughly readable story of man's earliest culture. *Prehistoric Man,* by Jacques de Morgan (New York, 1926), deals exhaustively with the tools, weapons, and arts of the same period. Jack London's *Before Adam* and Stanley Weyman's *The Story of Ab* are interesting accounts in fiction of the same period.

EGYPT. *Popular Stories of Ancient Egypt,* by Sir G. Maspero (New York, 1915), is an authoritative retelling of Egyptian stories, throwing light on the lives and beliefs of the early Egyptians. *Ancient Egypt from the Records,* by M. E. Monckton Jones (New York, 1923), is a good systematic history of all the dynasties.

ANCIENT TIMES. *The Ancient World,* by Willis Mason West (Boston, 1913), covers the whole ancient field with much accuracy of judgment.

ISRAEL. Dean Milman's *A Short History of the Jews,* for interest in the telling, is the best available history of the Hebrew peoples.

GREECE. *The History of Greece,* by George Grote, last revised in 1888, is the standard expanded history of the country. Lacking the fruit of recent investigations, it is still the storehouse of detailed knowledge concerning the Hellenic world.

ROME. *The Decline and Fall of the Roman Empire,* by Edward Gibbon, occupies a similar place as the classic expanded history of Rome. In spite of dull passages, it rises at times to a fine eloquence, and is scholarly throughout.

For the effect of physical Nature on history, *Geography and World Power,* by James Fairgrieve (New York, 1917), is invaluable.

II. The Halting of Civilization

THE CRESCENT DRAWS THE SWORD

The Fertile Crescent had dominated the earliest civilizations in the triple continents of Asia, Africa, and Europe. Now out of the Arabian desert, that fertile womb of great religions, came a Semitic faith, with the crescent floating ahead on its triumphant banner, that threatened for a time to unite all men under its swaggering rule.

Arabĭa, the vast desert wedge fringed by the Fertile Crescent, had long been the home of nomads, the land of the origin and the scatterings of the Semitic peoples. They had, long before, swamped the pre-Babylonic Sumerians; they had settled as Phoenicians and Canaanites in Palestine; they had overrun Mesopotamia as Babylonians and Assyrians; they had conquered Egypt as the Hyksos; they had established themselves as the Arameans in Syria; and, as Hebrews, they had partially conquered their "promised land." Throughout the desert the kinsmen of these settlers, the fierce Bedouins, still wandered, with their sheep, cattle, and horses. In the fertile patches or oases walled towns sprang up. Along the main caravan routes two of these, Medina and Mecca, were foremost in prosperity.

At the beginning of the 7th century A.D., Mecca was a town of about 25,000 population, Medina of 10,000 less. The latter was primarily a trading town; Mecca a place of pilgrimage, with its Kaaba, or sanctuary, a small square temple of black stones, the corner stone being a revered meteorite. This corner stone was regarded as a god, with the other tribal gods of Arabia under his control.

In Mecca, about 570 A.D., Muhammad, the founder of Islam or Moslemism, was born. He was reared in poverty, and never learned how to read or write with ease. He became a shepherd's boy, a camel driver, and finally a servant to a rich widow of a merchant named Kadija. This rich employer married her husky youth, when he was twenty-five, to the intense disapproval of her family; tradition says that she was forty at the time. The couple had several children, including one named Abd Manif, or servant of the Meccan deity Manif; for Muhammad had not yet discovered his own individual god. When he was forty, as a result of some meditation, Muhammad began to talk about the nature of god, reciting to his wife and a few intimates some verses which he said an angel had dictated to him, much as Yahweh is said to have dictated laws and commandments to Moses.

For some years Muhammad succeeded in converting only his wife Kadija, his adopted son Ali, a slave named Zeid, and a friend, Abu Bekr. Then he began to preach more openly, with limited success. His wife died, and the religious reformer had to flee to nearby Tayf, where he was driven out with stones and abuse. At this crisis Medina invited him to come there, and rule in the name of god. Muhammad hesitated for two years, sending some of his disciples ahead to destroy the Medinan idols. When at last the people of Mecca planned to murder him, he fled to the rival city. This flight, or *Hegira,* in 622 A.D., marked the beginning of his success. The Moslems regard the year as the year 1, dating all events from it.

Muhammad began his reign by raids upon the Meccan caravans; in a pitched battle, the people of Mecca were worsted. In a return engagement, the Meccans were successful. Muhammad rallied his followers, and after one more attempt Mecca came over to the new prophet. Mecca became the new pilgrimage center of the faith, and its converts had to pray toward the oasis city, instead of toward Jerusalem. The prophet sought first to convert Jews and Christians; finding them reluctant, due to his own ignorance of their religious beliefs, he turned finally to his own god, Allah, connected with the sacred black Kaaba stone, and abandoned more and more the Yahweh of Jew and Christian. There were military ups and downs, but in the end Muhammad's power extended over all Arabia; and then he died, in 632, at the age of sixty-two.

Muhammad was a statesman, diplomatic, cruel, treacherous, as the immediate need required. After Kadija's death he became excessively fond of women, marrying the young Ayesha, his favorite, and another wife, and adding numerous women and concubines to his establishment. He took his young cousin Zainib, already married to his adopted son Zaid, and made her his own wife; and was inspired to receive a special explanation and permission from Allah, to testify to the morality of this act. Out of such proceedings, including a mutiny in his harem, he died, leaving his fragmentary writings to be gathered up into the Koran, and in that form to waken his followers to world conquest, with their promise of immediate heaven to the warrior for death in battle—a heaven filled with houris, or virgins perpetually revirginated. Wine was forbidden, women were promised; and the world was to be taken, in the name of Allah.

Abu Bekr, Muhammad's friend and greatest defender, followed the prophet as Caliph or successor, and leader of the forces of Islam. This ruler stamped out a Bedouin insurrection, organized the little Arab force of some 4,000 fighters, and set out to conquer the nations, as Muhammad had threatened to their kings, in letters sent in 628 to all the rulers of earth. The attempt almost succeeded. Khalid was the most brilliant of the Arab generals, and served as well in the ranks, when the second Caliph, Omar, the prophet's brother-in-law, degraded him without just cause. Syria and Persia were attacked first, and their armies routed. Syria was subjugated, Mesopotamia and Persia conquered, Egypt taken without resistance, Jerusalem defeated as abjectly. In 125 years Islam reached from the Indus to the Atlantic and Spain, and from Kashgar on the Chinese frontier to Egypt of the cataracts. Constantinople was besieged by Caliph Moawiya between 672 and 678, and by Suleiman in 717 and 718; but the attempts were not full-hearted, and for a few centuries more the Byzantine empire remained the eastern bulwark of the cross against the crescent.

Othman, the third Caliph, out of bickerings over the succession, was murdered by a mob in 656; Ali, who followed him, was likewise murdered six years later. A schism or division split Islam, over this very right to the succession. For a century after Ali's death Othman's relatives, the Omayyads, ruled Islam. The capital was removed to Damascus. Yet the primary impulse had disintegrated. Rumors were spread of a Caliph who mocked the Koran, ate pork, drank wine, and refused to pray. A wicked family, the Abbasids, rivals of the Omayyads before the time of Muhammad, plotted against the ruling family, and in 749 the Omayyad Caliph was slain in Egypt. The first act of the first Abbasid Caliph, Abul Abbas, was to collect and slaughter every male of the Omayyad house, and to feast upon a table made of their massacred bodies. Independent Omayyad Moslem states arose, and the capital was moved by Mansur, second Abbasid Caliph, to a spot near the site of Babylon, called Bagdad. This was in 762. Most brilliant of the Abbasid Caliphs ruling from this city was Haroun-al-Raschid, immortalized in the *Arabian Nights*. In 809 he died; and, 200 years later, the Moslem Seljuk Turks flooded out of Turkestan, and conquered the empire of Bagdad, and all Asia Minor as well.

THE FLOWERING OF ISLAM

Meanwhile, the Moslem mind had risen from the near-illiteracy of Muhammad himself to the production of distinguished historians, philologists, and philosophers. Averroes the philosopher, of Cordova (1126–1198), and Avicenna the great physician (980–1037) from Bokhara, were preeminent among these. The Arabic numerals, which we use, were invented about this time; algebra, spherical trigonometry, distinguished work in physics and astronomy, medicine, and chemistry, all arose in their high culture. Through them Europe also received the invention of paper, which had been made by the Chinese.

It is difficult for us to grasp that Persia, Turkestan, and Afghanistan were more advanced in civilization, during the

5th and 6th centuries of our era, than France and England. Nor was the East far behind them. Hiung-nu or Huns had been plaguing China for centuries. Part of these, driven out by the Chinese, drove before them a kindred Mongol people, the Yueh-Chi, into the once Aryan region of western Turkestan. These became, or were merged with, a people called the Indo-Scythians, who had conquered India to Benares in the 2nd century A.D., wiping out the last traces of Hellenic rule. These Huns had discovered horse riding, as well as the use of the chariot and bodies of cavalry, all of which thus came from Asia. In India the Indo-Scythians, as we have seen, set up the Kushan dynasty, which ruled much of the northern part of the peninsula for centuries. Another group of the Yueh-Chi became the White Huns of Turkestan, a group of mere raiders, whose bloody leader Mihiragula was finally overthrown in 528. In 565 the strengthening Turks broke up the White Hun stronghold, and the remnants of the race were absorbed into neighboring peoples. In China, the half-Hunnish Tang dynasty, followed by the Sung and Ming dynasties, which ruled down to 1644, gave the land a prosperity, a happiness, and an artistic achievement far in advance of the European west. Explanations of China's backwardness after this period lie in her greater conservatism than the West, her intricate non-phonetic written language, and the consequent respect for traditionalism, which paralyzes progress in any land.

THE EMPIRE OF CHARLEMAGNE

When the Franks began their career of expansion, they were pagans. Their king, Clovis, at the age of twenty, in 486, defeated the Roman forces at Soissons. Ten years later, at the battle of Strassburg, he conquered the Alemanni, and, what is more important to later history, exchanged his pagan gods for the orthodox Christian god, in payment of a vow made before the battle, that he would accept conversion if victory came to him. The Christian Yahweh had become a god of battles. So Clovis and 3,000 warriors were baptized immediately after the victory; which no more made them followers of the teachings of Christ than it made them Tories or epileptics.

Immediately, with his new religion as a pretext, Clovis drove the Burgundian and Visigoth out of their lands, and annexed these, on the theory that they had accepted the Arian variation of Christianity, which rejected the Trinity or three-in-one god, and were more strictly monotheistic. During the next thirty years, by bloody treacheries, Clovis got rid of the other Frankish kings, and made himself sole ruler. His sons crossed the Rhine, beyond the farthest borders of the old Roman world, and added Bavaria and Thuringia to the Frankish sway. Their lands included nearly all modern France, the Netherlands, Switzerland, and Germany almost to the Elbe. Such territory today would make the greatest power in Europe. In the 6th and 7th centuries, its preeminence was even more marked.

The family of Clovis is known, from his grandfather Merowig, as the Merovingians. For two centuries after the death of Clovis, this family held the throne. The Frankish state had four great divisions—Burgundy and Aquitaine, and the East Franks and West Franks, in Austrasia and Neustria. After conflict between the nobles ruling these domains, during the reigns of the later Merovingians, the "Do-nothings," the struggle for supremacy narrowed down to Neustria and Austrasia. The important officers were the so-called "mayors of the palace"; the king became merely a long-haired figurehead, to be shown to the people one day in the year, and to retire to his swinish pleasures for the rest of the time. In 687 the Austrasians, under their mayor, Pippin of Heristal, routed the West Franks, and Pippin became in reality the second founder of the Frankish empire.

Pippin's son, Charles Martel, or Charles the Hammer—a name derived from the hammer-blows of Charles against his enemies—made himself sole ruler of the Frankish state, ruling as mayor; and it was he who faced the Moslem invasion in western Europe. In 711 the Arabs had entered Spain, mastered the kingdom, crossed the Pyrenees, and spread over Gaul to the river Loire. Christendom feared that the crescent would round to the full moon. But in 732, in the plains near Tours, Charles Martel and his mailed Austrasian infantry, their backs against the western sunset, met the gallant turbanned Saracenic horsemen; and the stern living iron wall threw back the Orient once more. Since the Moslems were far ahead of the Christians in art, science, and general culture, this elevation of the cross may have been a further blight upon Europe, rather than a blessing.

Charles's son Pippin, with the pope's assent, assumed the title of king; the pope's consent being in return for the Franks's double victory in Italy over the Lombards, at the pope's entreaty. On the second expedition, in 756, Pippin presented to the pope the territory the Lombards had recently seized from the Exarchate of Ravenna. This "Donation of Pippin" created the Papal States, stretching across Italy from Rome to Ravenna. In 768 Pippin was succeeded by his son Karl, known to history as Charlemagne, or Charles the Great (*Carolus Magnus*). A tall full-blooded German, fair haired, fair skinned, with great blazing blue eyes, at home in outdoor sports, able to learn to sign his name in his old age, he was a genius among barbarians. His reign of nearly fifty years was marked by many unromantic border wars of his planning, but in which he shrewdly did not participate.

Repeatedly he defeated the pagan Saxons, and forced them to be baptized as Christians; nine times they repudiated this forced dose, and relapsed into their ancient customs, which included human sacrifice and eating the bodies of their witches. Charles was cruel and vindictive, at Verden massacring 4,500 leaders of rebellion, surrendered at his demand. Without difficulty the Saracens were thrust back to the Ebro; Charles expelled the Lombards again, and had himself crowned king of Lombardy; Bavaria was assimilated. The savage Mongolian Slavs and Avars, who threatened to the east, were next pushed back. Lastly, on Christmas day, in 800 A.D., Charles, at Rome, was crowned by Pope Leo III as Charles Augustus, Emperor of the Romans. The Roman Empire was revived in name, and the bloody blond Christian Teutons held Europe under their barbarous yoke.

The empire was so backward that there was no taxation. The king's income came from his estates; and his shrewd housewife's eye saw to it that not a turnip nor an egg failed to come to the royal treasury. He was succeeded, in 814, by his son Louis the Pious, a feeble thing, at whose death his unruly sons and their sons fell to squabbling over the dismembered fragments of the empire. By 870 the empire had broken up into three kingdoms, the West Franks (roughly comprising France and Belgium), the East Franks (the Germanic portion), and Italy. The lack of roads, and the great want of money, which prevented the employment of a standing army, as well as continuing attacks of Moslems, Slavs, and the wild Teutonic Northmen from the beaches of Denmark, Sweden, and Norway, merely increased the disorderly bloody brawls of the nobles.

This was the age when the face of Europe became pitted with gloomy fortress-castles, from which raiding robber barons swooped down to prey on their neighbors. Slavery had given way to serfdom, a system where the exploited were not bound physically to a human owner, or to the state, as in the case of the helots of Sparta; but were bound to the soil, with no power to move, all being required to work their land until death united them to it in a long and welcome vacation. The serfs were subservient to the small land-owners; these to larger land-owners; these to the great noble land-owners; and these, in theory at least, to the king. This system was called feudalism, and badges the Middle Ages or Medieval period of Europe's history.

Vassals, or underlings, owed to their lords military service when demanded, besides countless other exactions, some of which were as absurd as having to light the lord to bed with a candle, or to furnish him with one great yule log at Christmas. Feudalism became the age of constant feuds; the church, weakened by the infinite private raids and murders, in 1000 A.D. attempted to free church institutions, women, and peasants with their cattle and plow, from attacks; and further to establish the "Truce of God," which provided that warfare and private murder could go on during all days except the weeks of Lent, certain holy days, and the last four days of each week.

In 936 Otto the Great came to the throne in Germany, driving the Huns back into Hungary, where they settled, gave their name to the land, and have since stayed. In 962, a pope, grateful for the German's aid, crowned him emperor, as Charlemagne's successor. The "Holy Roman Empire" thus formed—which, as some witty historian says, was neither holy, Roman, nor an empire—became engaged in a long up-and-down struggle with the Italian popes. The recent rule against marriage of bishops, abbots, and certain other clergy, was generally neglected during the 10th and 11th centuries; and, to keep its property, the church needed to prevent marriage and the churchly father's provision for his heirs. The buying and selling of church offices, called simony, was another weakness in the papal system; rising to such a height that at times the papal chair itself was bought.

The Emperor Henry IV, from 1065 on, constantly fought Pope Gregory VII, the pope excommunicating the lay ruler, and the German clergy in retaliation deposing the pope. In the end the emperor won, and when Rome fell into Henry's hands, the pontiff withdrew and died soon afterwards. The conflict over whether king and emperor, or officers of the church, should give the *investiture* or grant of power to a new church officer, was settled in 1122 at the Concordat of Worms, providing that the church could elect the new official under the eye of the king, while the king was to invest the new bishop or abbot with his governmental powers by a touch of the royal sceptre. Thus the lay ruler granted governmental powers, and the church, spiritual powers.

In 1152 Frederick I, called Barbarossa from his red beard, came to the throne. A member of the Hohenstaufen family, his object was to restore the dyspeptic Holy Roman Empire to its old splendor and power. For forty years he tried vainly to conquer the wealthy growing Italian cities; and, on a crusade to the Holy Land, he lost his life. Frederick II, between 1212 and 1250, organized magnificently the kingdom of Sicily, which the Germans had acquired by a marriage of state; and his critics insist that he was not even a Christian, believing that Moses, Christ, and Muhammad alike were imposters. His struggle with the popes was complicated by his vow to go upon a crusade. He actually conquered Jerusalem, and was recognized as its king. Yet the church, disliking his actions, finally deposed him; and at his death the empire came to a final end. Unlike England and France, Germany, as well as Italy, was henceforth broken up into small warring units, not to be reunited again until the 19th century.

THE CRUSADES OF CHRIST

We have mentioned the crusades, those bloody military expeditions to Syria and Palestine, undertaken superficially for spiritual reasons. In the 7th century Jerusalem had been taken by the Arabian Moslems, who tolerated Christian pilgrims to the traditional tomb of Christ. The fierce Seljuk Turks supplanted the milder Arabs, and menaced the Eastern empire at Constantinople. Their emperor Alexius (1081–1118) appealed to Pope Urban II; and his church council at Clermont in France, held in 1095, gave the first great impetus to the crusades.

Urban appealed especially to those "who have hitherto been robbers, now to become soldiers of Christ." His plea succeeded, and the robber class proceeded to rob, in the name of Christ, throughout much of Europe and Asia. The pope promised that the journey itself would be a complete penance for all sin—an easy way of repaying god and man for murder, adultery, rape, incest, sodomy, and similar popular medieval activities. Moreover, the church excused interest upon debts owed by crusaders, and permitted them to mortgage property against the wishes of their feudal lords. So shrewd business considerations helped swell the armed exodus toward Palestine.

Vehement preachers of the crusades, like Peter the Hermit, had collected, in France and along the Rhine, a motley army of ignorant commoners, peasants, workmen, tramps, robbers, women, and children. Peter the Hermit, the knight Walter the Penniless, and other humble leaders impoverished financially and mentally, led the mad horde, the "people's crusade," all confident that their god would guard, feed, and house them, and give them easy victory over the infidel. The Hungarians slaughtered many of these, in reprisal for wholesale robberies throughout Hungary. Part of these, after massacring the Jews of the Rhineland, reached Nicaea, to be slaughtered there by the Turks. Thus ended the first abortive attempt.

The official first crusade was led by famed armed knights: those from Provence, under the papal legate and Count Raymond of Toulouse; the Germans, under Godfrey of Bouillon and his brother Baldwin, both of whom later became rulers of Jerusalem; and the French and Normans of southern Italy under Bohemond and Tancred. They reached Christian Constantinople; and their conduct was such that Emperor Alexius ordered his soldiers to attack Godfrey's men, for their insolence, rapine, and robbery. In the spring of 1099 some 20,000 warriors moved against Jerusalem. The city was taken, and with shocking barbarity the armed soldiers of Christ massacred the inhabitants. Godfrey, and, on his death, his brother Baldwin, were named rulers of Jerusalem, as "defenders of the Holy Sepulchre."

Edessa, Antioch, parts of Tripoli, Acre, Sidon, and other towns fell to the Christians. New crusaders started from Europe, most of whom were killed or lost passing through Asia Minor. Two knightly monkish orders, the Hospitallers and the Templars, were founded at this time, and soon grew rich, arrogant, and unspeakably depraved. Early in the 14th century the orders were ended bloodily in France, their members being accused of heresy, idol worship, and the systematic insulting of Christ. Such accusations, it must be remembered, came from their enemies; but behind the smoke there may have been a considerable conflagration.

The fall of Edessa, in 1144, led to the second crusade. Eloquent St. Bernard promoted this, the king of France and the German emperor, Conrad III, agreeing to go in person. St. Bernard himself described these soldiers of Christ:

> In that countless multitude you will find few except the utterly wicked and impious, the sacrilegious, the committers of homicides, and perjurers, whose departure is a double gain,

by ridding Europe of such men and cursing Asia with them. This crusade was a miserable failure.

In 1187, Saladin, a brilliant Kurd preaching a Jehad, or holy war against the Christians, recaptured Jerusalem. This evoked a crusade led by Frederick Barbarossa, Richard the Lion-Hearted of England, and his rival Philip Augustus of France. In 1192 Richard concluded a treaty with Saladin, allowing Christians to visit Jerusalem in safety and comfort. The fourth crusade, managed by the wily Venetians, captured Constantinople instead of Jerusalem in 1204, temporarily splitting up the Greek empire, with Count Baldwin of Flanders as "Latin Emperor." In 1212 the hysterical "children's crusade" came to disaster, part of the young victims being captured and sold as slaves in Egypt, and part disappearing in Italy. Later crusades went against the Moslems in Egypt. Jerusalem was lost in 1244, only to be regained by the Christians during the 20th century World War. The word crusade soon fell into disrepute, owing to the undignified haste of the popes in preaching crusades against all rivals, as against French heretics, King John of England, and Emperor Frederick II.

The class that benefited most from the crusades was the shrewd Italian merchant class, especially those from Genoa, Venice, and Pisa. The West became tied to the East by the trade they instigated; the Greek East taught the West how to assail walled towns; heraldry, the practice of denoting relationships by coats of arms, came into being; West met East in an interchange of cultures, to the great benefit of the West. The only thing that showed no gain was the religion of Christ. These by-products could have come peaceably from Constantinople, and Moslem Sicily and Spain, without the bloody violations of the near East.

THE GREAT YELLOW EMPIRES

Next came the final and most terrible of all the assaults of the homeless Oriental nomads upon the civilizations of the West and the East, in the Mongol raids which began in the 13th century. These nomads appeared first in a land north of China, where the Huns and Turks had originated; they were kinsmen of these people. Under their leader, Jengis Khan, their power grew with terrific rapidity. Islam had broken down; China was in "the age of the Ten States," an hour of confused rebellions. In China the Sung dynasty arose out of this, to wither away before the Hunnish Khitan tribes, and then before the more dreadful Hunnish Kin empire. In 1138 the capital of China was withdrawn from interior Nankin to the coast town Han Chau. To the north the Kin empire menaced; northwest the Tartar empire of the Hsia threatened. India was ruled largely by an adventurous ex-slave, Kutub, from his separate Moslem state of Hindustan. Thus Asia lay, when Jengis Khan began to weld his power between Lakes Baikal and Balkash, as the 13th century opened.

The Mongols had been a subject tribe of the Hunnish Kin empire. They were an unruly horde of nomadic tent-dwelling horsemen, living mainly upon mare's milk and meat. They tested their strength against the Kin, and won, learning from this warfare most of the Chinese military skill. The first attack of Jengis was aimed westward, where he absorbed without much fighting the Tartar Kirghis and the Uigurs, or Tartars of the Tarim basin. Attacking the Kin empire, he took Pekin in 1214. The Khitan tribes, who had bowed so recently to the Kin, joined his strength. Turkestan, Persia, and North India were for the moment united in the Kharismian empire: and this power stupidly put to death the envoys of Jengis. In 1218 the disciplined horsemen of the steppe leader thundered down into Turkestan, using some of the dreaded gunpowder from China. Bokhara fell; the capital, Samarcand, fell. The Mongols ravaged from southern Lahore to the western waters of the Caspian. North of the

Caspian the Russians were encountered, and the Grand Duke of Kieff, their leader, was taken prisoner. The Mongols appeared on the coast of the Black Sea; Constantinople was in a panic. Other forces during the same time annexed the empire of the Hsia in China. And then, in 1227, Jengis Khan died, leaving a growing empire already reaching from the Pacific westward to the Dnieper.

The chief administrator of the plain chieftain, Yeliu Chutsai, from the Kin empire, tempered the savage wrath of the Mongols, and guided their actions with statesmanlike skill. In the Mongol capital, Karakorum in Mongolia, an assembly of the nomad leaders chose Ogdai Khan, son of the dead leader, to head them. The last southern fragments of the Kin empire were subdued in 1234; the Sung empire in south China aided the Mongols in this. In 1235 the Mongol hosts swept across Asia to Russia, destroying Kieff in 1240, and subjecting nearly all of Russia. Poland was desolated, Lower Silesia conquered in battle in 1241, with Frederick II apparently supine before the Mongol onslaught.

Ill at ease in the wooded miles of Silesia, the Mongols, used to the plains, turned southward to settle in Hungary, massacring or absorbing the related Magyars, as these had previously murdered or absorbed the mixture of Scythians, Avars, and Huns before them. Ogdai suddenly died; there was trouble, in 1242, about his successor; but there was also increasing Mongol unrest against Persia, Asia Minor, and South China. So the glittering yellow flood turned eastward again of its own will.

Mangu Khan became chieftain in 1251; China was defeated, and in turn the conquering Mongols became Chinese in civilization and action. Tibet was laid waste, Persia and Syria vigorously invaded. Bagdad was captured, and the entire population put to the sword. In 1260, after Mangu's death, Kublai Khan was elevated to the headship. He made Pekin his capital, and at his death in 1294 the headship of the Great Khan vanished. There were instead now five Mongol empires—the one with Pekin as its capital; the empire of Kipchak in Russia; the Ilkhan empire founded in

Persia by Hulagu, brother of Kublai Khan, which held the Seljuk Turks in Asia Minor in vassalage; a Siberian state between Kipchak and Mongolia; and "Great Turkey" in Turkestan. The Mongols of this period did not penetrate India beyond the Punjab; and in 1260 the Sultan of Egypt halted Ketboga, Hulagu's general, in Palestine, and prevented a Mongol invasion of Africa. The Mongol assault had spent its main vigor; thereafter its story is one of scattering and decay.

So far, the Mongol religion had been Shamanism, a set of early pagan beliefs. The great religions began to bid for the conversion of the Mongols, Christians, Buddhists, and Moslems competing for an alliance with them. Christianity failed, through inability to understand the requirements of the task, and through its own weakness; for these sturdy plainsmen, who might have become vassals of Yahweh, saw no reason to become subservient to cringing luxury-loving popes and cardinals in Italy or France.

The Ottoman Turks had entered Asia Minor, settling near the Seljuk Turks, long before Jengis Khan began his sweep of conquest. Gradually they became the dominant element in the weakened "empire of Roum," the Seljuk power. They pushed in hostile quietness into Macedonia, Epirus, Illyria, Yugo-Slavia, and Bulgaria. Slowly they welded an empire that reached from the eastern Taurus Mountains to Hungary and Roumania, with Adrianople as their chief city. Their standing army, the Janissaries, similar to the Mamelukes who dominated Egypt, was composed of Christian youths converted to Islam and was similar to the Bektashi order of dervishes. While remaining closely united to the Greek empire, the Ottomans continued to absorb the empire's territories.

THE YELLOW FLOOD ENGULFS CONSTANTINOPLE

In 1453 Constantinople at last fell to the Moslem sultan of the Ottomans, Muhammad II. The Greek emperor was slain, and looting and massacre raged throughout the city. The great church of Saint Sophia, built by Justinian in 532, was robbed of its riches, and converted to a mosque, or

Moslem church. Muhammad's restless eye looked greedily toward Rome. He took and looted the Italian town of Otranto; but his death in 1481 ended his effort.

Under Bayezid II (1481–1512), who succeeded him, most of Greece was subjugated, and Poland harassed. Selim (1512–1520), Bayezid's son, carried Ottoman dominance over Egypt and Armenia. Selim purchased the title of Caliph from the last degenerate Abbasid, and received the sacred banner and relics of the prophet Muhammad. Suleiman the Magnificent (1520–1566), who came next, took Bagdad, Algiers, much of Hungary, and barely failed to take Vienna. During his reign the Ottoman might reached its highest development.

The Mongols in China and Central Asia ultimately adopted Buddhism, due to the especial weakness of the Christian church at this period, with the pope merely a kept priest of the French king, and later with two rival popes bickering at each other from Avignon and Rome—a division that lasted from 1378 to 1418. The Mongols in Russia, western Turkestan, and the Persian Ilkhan empire, were converted to the Moslem worship of Allah. After 1280, the Chinese records consider Kublai Khan as a Chinese king, the founder of the Yuan dynasty (1280–1368). This, as we have said, was succeeded by the nationalistic Ming dynasty (1368–1644), a brilliant line of civilized emperors, who held the control until the northern Manchus, related to the Kin whom Kublai had overthrown, conquered China, and established a dynasty which lasted until the formation of a republic in China in 1912.

In much of Turkestan, the Mongols relapsed into nomadism. In the 17th and 18th centuries the Kalmuks established an important empire, but troubles over the succession broke it into lessening fragments. In 1757 the Chinese recovered Eastern Turkestan from the Kalmuks; Tibet, even more closely united to China, became the great home of Buddhism. Over much of west central Asia, Persia, and Mesopotamia, these nomads are still found, still engaged in petty squabbles against the more sheltered townsmen. The Kipchap Mongols, in Russia, remained nomads, their religion being a blend of early Shamanism and a few Moslem elements. Their chief leader was the Khan of the Golden Horde. West of their territory in south Russia and western Asia beyond, the region now known as Ukrainia, the old Scythian peoples, Slavs intermingled with Mongols, remained nomads, professing Christianity—these being the notorious Cossacks.

Throughout the Kipchap regions a number of towns grew great, usually paying tribute to the nomad leaders. Kieff, Moscow, and other towns continued their town life under Christian rulers, either Tartar governors or Russian dukes, who collected the tribute for the Khan of the Golden Horde. In 1480, under Ivan the Great, the third Ivan, Moscow threw off its allegiance to the Khan, and refused to pay further tribute. Ivan assumed the Byzantine double-headed eagle for his emblem, since Constantine's successor no longer ruled in Constantinople; and claimed to be the heir to the Byzantine empire, because of his marriage in 1472 to Zoe Palaeologus, of the imperial family. This avid grand duke seized the old Northman trading state of Novgorod to the north, and thus laid the foundations of the modern Russian state.

His grandson, Ivan IV, called The Terrible because of his insane cruelties, was the first of these Moscow rulers to adopt the title of emperor, in the form of Tsar, a corruption of Caesar; yet he was in essence a Tartar of the autocratic Russian type, rather than a European. West of the Kipchak realm a second Slav power had grown up before the 12th century, in Poland, which was Roman Catholic, and not "orthodox" or Greek Catholic, as Russia was.

In Persia, Mesopotamia, and Syria, the Mongols under Hulagu and his successors were more ruthless in destruction than elsewhere. The towns were wiped out, the irrigation system 8,000 years old was destroyed, and the country became a waste. The impulse to ruin reawoke in the 15th century under Timur the Lame, or Timurlane, a descendant on the female side from Jengis Khan. With Samarcand as his capital, he spread his rule over Kipchak, Siberia, and southward to the Indus, assuming the title of Great Khan in 1369. A savage killer, gloating over pyramids of skulls, his chief achievement was a pyramid constructed, after the storming of Ispahan, of more than 70,000 skulls. The still growing Ottoman Turks paid him tribute, as did Egypt; the Punjab was laid waste, and Delhi surrendered, to learn Timurlane's mercy, a ghastly massacre of the population. His death in 1405 left vast reaches of the known world withered and ruined. Fifty years afterwards, his dynasty was wiped out by another wild Turkoman horde.

In 1505, a Turkoman chief, Baber, descended from Timurlane and Jengis Khan, was forced to flee over the Hindu Kush to Afghanistan. His force grew, and he won control of Cabul. He laid claim to the Punjab, because Timurlane had conquered it a century before. In 1525 he defeated the Sultan of Delhi decisively, and thereafter adopted the title of Emperor of Hindustan. His conquests, which had reached Bengal, were terminated by his death in 1530. His grandson Akbar conquered India as far as Berar, and his great-grandson Aurungzeb (1685–1707) dominated nearly all of the peninsula. This Mogul (or Mongul) dynasty gave India its most resplendent period. Akbar was by far the greatest of the Mongol rulers. The partial centralization of India today is due to his constructive statesmanship.

About the beginning of the 15th century, small drifting bands of a refugee eastern people, called Gipsies, appeared throughout Europe. Their name comes from a corruption of Egypt, from which they were supposed to come, in popular superstition; their own accounts locate their original home as Asia Minor, from which they were driven by the massacres of Timurlane. Their strange speech is related to the language of North India, with Armenian and Persian elements; they are still nomads, fortune-tellers, pedlars, horse-dealers, and showmen. Their nomad camp life appeals strongly to many in the civilized world that modern man wanders so aimlessly through; for in them we see what our fathers once were, in the aimless, careless days before civilization, that mixture of blessing and curse, came to trouble and enslave the sons of men.

EUROPE UNDER THE POPES

The history of Europe, from the 12th to the 19th centuries, consists of two great movements—the intellectual and spiritual awakening inspired by the classic pagan cultures, called the Renaissance, and the revolt against autocracy in religion, or the Reformation. After man emerged from the Old Stone Age to the New Stone Age, history consisted in two great movements: the widening ripples of nomadic shepherd peoples inundating the known world from the steppes of Asia; and temporary civilizations formed in advantageous geographical spots, as the Nile Valley, Mesopotamia, the way states, Carthage on the African coast of the Mediterranean, and the Greek and Roman peninsulas—civilizations which in turn were overrun by the wild nomads. The march of the peoples that ended Rome, and the great Moslem and Mongol invasions thereafter, largely ended this process of widening ripples of nomad conquest. Europe found herself abjectly prone beneath two vast evils caused by the imperialized Roman Catholic Church—ignorance of man's true past, caused in part by Christian contempt and destruction of pagan learning; and a vicious churchly absolutism. History since then has been largely a revolt against these oppressive powers, and against capitalistic oppression, which later replaced them, in more advanced communities.

The medieval church was a monarchy, under the elective popes. Many of these were men distinguished for piety, and for enactments spreading Christianity in its essence; as well as gifted statesmen, who succeeded in bringing the temporal rulers, the earthly kings, to their feet. Gregory the Great (590 A.D,) and the celebrated Gregory VII, who ascended the papal chair in 1073, illustrate the height of papal influence. This latter pope forced the young ruler of Germany, Henry IV, to stand barefoot, as a humble pleading pilgrim, for three days outside the pope's door at Canossa, before admitting the cringing suppliant to the papal presence. But the popes were chosen by elections of the college or group of cardinals; and human elections tend to degenerate, by bribery and other unworthy motives. Many popes were men of piety and decency; many more were, by modern moral standards, viciously indecent. The modern reader is lost in the multiplicity of the names of the popes; elected mainly as old men, they held office on the average only about two years, which means almost 1,000 popes since the beginning. To show how recently such practices lasted, there were public charges of immorality against popes as late as 1799. Most notorious of all was the Spaniard Rodrigo Borgia, who became pope as Alexander VI, whose offenses are detailed in all histories of the times.

Such evil instances do not of necessity indict the church these men headed, except through the iron logic that a tree may be judged by its fruits. Below the autocratic popes, much of the conduct was worse. Reformers within the church, like saintly Francis of Assisi and stern Dominic of Spain, founded orders based on the simpler teachings of Jesus; in less than a century, the first order had reabsorbed the luxurious vice of the papal court, and the second was "persuading" heretics to follow the gentle Judean carpenter by the hideous Judas-like tortures and killings of the Inquisition, which gutted Spain, and much of Europe, of its best blood, and set Occidental civilization back for centuries.

EUROPE AWAKENS IN THE PAGAN RENAISSANCE

After the blond nomads gutted Europe, the Roman towns largely decayed. New towns sprang up, foul and crowded, huddled around the castles of the rapacious nobles. From the 12th century onward these towns, sinewed by trade, began to demand charters from their feudal lords, and, at last, to exact them. The artisans formed trade guilds, which controlled processes of manufacture, or "hand-making"; these guilds were composed of both the employers and the employed alike. Trade routes tied Europe to the East, in an intricate criss-cross of roads. The map of the semi-civilized world had grown enormously, since its curved beginning in the Fertile Crescent, with the trading way-states growing wealthy from early commerce. New geographical considerations caused new cities to expand along the new trading ways; the Italian cities, and the great Hanseatic League of trading cities in Germany, were foremost, the latter uniting with some success against the raiding barons.

The Christian world held that the taking of usury, or interest on a loan, was wicked; this idea traced back to the Mosaic prohibition of the practice, in the Old Testament. The Jews had become the pariahs or outcasts of the Christian world, due to priest-encouraged hatred of them as the executioners of Jesus. The two chief trades of the Middle Ages were farming and soldiering, linked together by the institution of serfdom, which bound the farmer both to the land below him and to the lord above him, in intimate ties. Since the Jew was a pariah, the medieval world did not permit him to become a farmer, or a soldier—thus seeking to exclude him from the essential occupations of the day. The barbarous Teutonic nomads had had no need for money-lenders; but this invention of the older cultures slowly grew among them. Christians could not lend money out at usury or interest; but the Jews, whose souls were damned already, could not suffer from this sin; and so the Jews became slowly the money-lenders and the wealthy class of the medieval world. A strange outcome, since it was the Jewish Mosaic code whose prohibition of taking interest was at the root of Christian prejudice against it! If Christian shrewdness had not invented some way to make the taking of interest moral, most of the economic power would ultimately have come into the hands of the Jews. But as early as the 13th century, the Christian Lombards invented, in crude ingenuity, a way out of the dilemma. Instead of taking interest, they provided in every loan for the payment by the debtor of heavy damages, if the payment was delayed a few hours beyond the stipulated moment for payment; and it was unalterably understood that this delay must take place in every case, and the damages paid. Soon enough the Christians were accepting interest.

It was in the trading cities of Italy that the awakening of Europe, the pagan Renaissance, had its real birth. Resplendent Venice, with islands for house-foundations and rivulets and canals for streets, was foremost among these; Milan and Florence were almost as celebrated. The mind of Teutonized Europe, after its fallow centuries, was ready for a new seedtime: and the rediscovered classics of Rome and Greece were the seeds that brought it to rich swift harvest. The fruition in art we will study in Book IV: *The Outline of Art;* the cumulative effect on literature, in its appropriate place. It is enough here to indicate that the result was to replace faith with scepticism, or the spirit of doubt: and scepticism is the first condition of progress.

The first few centuries of Christian faith had developed, as the popular ideal, the hermit saint, whom Lecky describes as

> A hideous, sordid, and emaciated maniac, without knowledge, without patriotism, without natural affection, passing his life in a long routine of useless and atrocious self-torture, and quailing before the ghastly phantoms of his delirious brain.

Saint Simeon Stylites was the most famous of these—with his huge cord so tightened into his flesh that his body's covering putrefied and formed maggots, which, as they fell off, the saint had an attendant restore to the foul flesh, saying to the worms, "Eat what God has given you." Such saints gloried in killing their parents by ingenious pious parricide; and prayed so constantly, that several are affirmed to have developed camel's knees. This foul, unsocial ideal was replaced, after Charlemagne's time, by the knightly ideal of the Christian ruler or wandering knight, celebrated by the troubadours and minnesingers, who were the kept poets of the period.

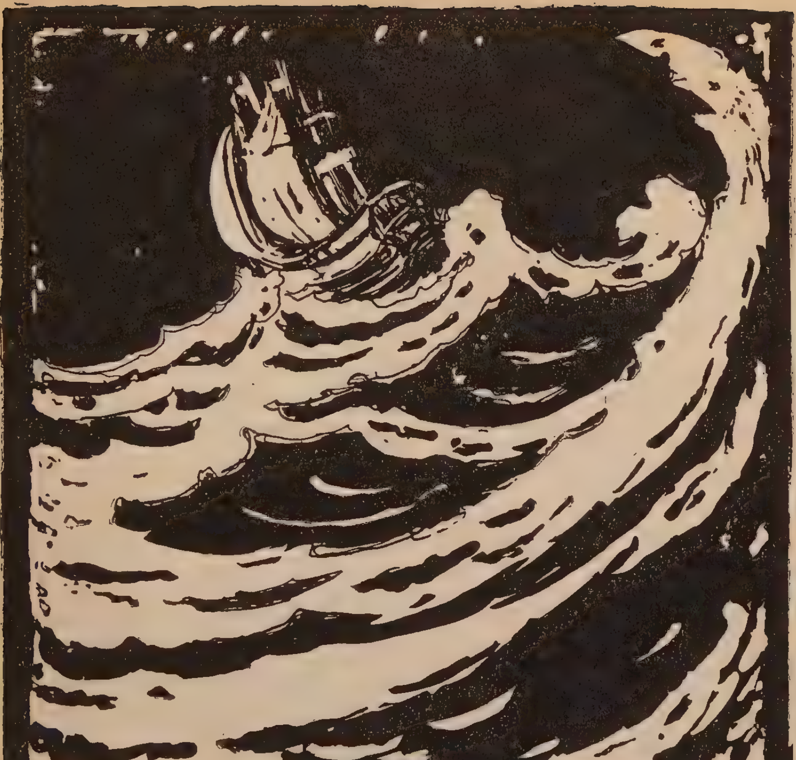
The ideal expanded into the medieval magnifico, attended, not by conventionalized poets of feudal love, but by the scholars and artists of the pagan Renaissance. In the absence of the great classics of the past, pious churchly historians had crammed the libraries with great volumes of absurd miracles; while the science and philosophy consisted chiefly in churchly perversions of Aristotle. Then came the establishment of the early universities, at Paris, Bologna, Oxford, and elsewhere; these, especially after the Greek writings, coming from the Constantinople Turks and the Arabs in Spain, began to penetrate Europe, did their part in widening man's knowledge.

A strange forerunner of the pagan Renaissance was Roger Bacon, an English Franciscan monk, who died about 1290. He advocated experiment instead of authority; and experiment is the cornerstone of modern science. As early as the 15th century, the Italian scholars had become enthralled in the classic literatures of both Rome and Greece. A new force speeded up the process. Up to this time, books had been hand-made. Before 1446, printing from movable type was invented, both by Coster in Holland and by Gutenberg in Mainz, Germany. Now the world's knowledge could be prepared cheaply for distribution, and the over-rested mind of man sprang forward with a leap.

Side by side with the awakening in art went science. Between 1260 and 1295, Marco Polo, a young Venetian, with his father and uncle, travelled all the way from Italy to China; Marco himself rose high in the favor of Kublai Khan, and on his ultimate return to Europe wrote out his memorable travel adventures, broadening European man's view of the world. By 1445, Portuguese navigators reached Cape Verde, Africa; by 1486, they rounded the Cape of Good Hope; by 1498, they reached Calicut, in Hindustan. The commercial object of these expeditions was to secure spice, to preserve the meats eaten in Europe from decay, in an age ignorant of ice storage. When the Turks closed the eastern trade routes to China and India, European man, suspecting that the earth was round, began to dream of a westward passage to the spicy Orient.

In 1492, a Genoese mariner named Cristoforo Colombo or Colon, better known to us by his Latinized name of Christopher Columbus, sailed under the banners of Ferdinand and Isabella, Christian sovereigns of Spain, across the Atlantic Ocean, and in five weeks discovered the island of San Salvador, in the Bahamas. On subsequent voyages, in 1498 and 1502, he discovered the mainland of South America, and the coast of Central America, vainly seeking along it some westward passage to China and India. Pope Alexander VI divided the western world between Spain and Portugal, giving Portugal all east of a line 370 leagues west of the Cape Verde Islands, and giving Spain all west of it. This was in 1493; as early as 1497, an Italian named John Cabot, sailing under the English flag, reached the mainland of North America, and somewhere in Labrador planted the English ensign. A Florentine named Amerigo Vespucci, sailing for the king of Portugal, in 1501 made a memorable voyage to South America; and from him the twin continents, the Americas, received their name.

The next century was an era of thrilling explorations. Between 1519 and 1522 the Portuguese Ferdinand Magellan, sailing for Spain, sailed around the Horn, and was killed by Philippine natives; but his seaworthy *Victoria* continued on its westward voyage, ultimately arriving at Lisbon. By 1508, the Spaniards, with Haiti as a base, had conquered and colonized Porto Rico and Cuba. Balboa reached the Isthmus of Panama in 1513, and Ponce de Leon, the same year, traversed Florida seeking the fountain of eternal youth. In 1519 Hernando Cortez took and sacked the Aztec kingdom of the emperor Montezuma, in Mexico; ten years later, Cabeza de Vaca made his way from Texas and Mexico to the Gulf of California; at the same time, the ruffian Pizarro overran the Inca civilization of Peru, adding its silver mines to the Spanish treasury. For the three years after 1539 Hernando de Soto traversed the eastern territory bordering the Gulf of Mexico, leaving his fever-stricken body beneath the waters of the Mississippi; at the same time Coronado wandered northward, seeking the fabled seven golden cities of Cibola. In 1524 the Italian Verrazano, sailing for France, charted the north Atlantic coast of North America; eleven years later, the French Jacques Cartier pushed his way up the St. Lawrence River to the site of the Indian village where Montreal stands today. England was not far behind; and these three nations slowly conquered in blood the barbarous Mon-



Louis Blomberg

There is no raging swirl of sea
Can wall away man's mastery;
There is no peak, no reach of air,
But he will plant his standard there.

gols inhabiting the Americas, better known as the red men, or American Indians.

England now comes prominently into the European story. Iberians, Celts, Romans, Angles, Saxons, Danes under Cnut in 1017, and French Northmen or Normans under their duke, William, in 1066, had successively conquered the island; the Normans remained the masters. Henry II, of the Plantagenet family (1154–1189), united strife-scattered England, and held more territory in France than the French king himself. A weak son of this king, named John, was forced by the English nobles to sign Magna Carta, that basis of English civil rights, laying the foundations for the land's squire democracy, which is slowly dying today, largely as a result of industrialism and the World War of 1914. After the weakening bubonic plague or Black Death, the human form of a disease endemic among jerboas and other small rodents around the head of the Caspian Sea, which swept Europe in 1348, and in the next year killed more than half of the English, France at length threw off the English yoke. This was largely the work of the visionary peasant girl, Joan of Arc, a member of the popular witch cult that had survived throughout Europe since pre-Christian days. Joan, who has since been canonized as a Roman Catholic saint, was in the end executed as a witch; and nine years later her chief lieutenant, Gilles de Rais, a sadistic follower of the same cult, notorious for his murders of children, was also executed as a witch. We shall deal more fully with this ancient religion in Book V: *The Outline of Religion.*

Civil wars in England, broken by the brilliant reign of Queen Elizabeth, resulted in a brief kingless commonwealth under the Puritan Cromwell (1640–1660), and in a restoration of the Scotch house of Stuart to the throne. This was succeeded by the alien houses of Orange, in the persons of William and Anne, and of Hanover, especially as incarnated in the four stupid German Georges I, II, III, and IV. The Renaissance, commencing with the revival of pagan learning in Italy, reached England in its full glory during the bright rule of Elizabeth. The rebellion of the Fronde, in France, had been an uprising of unruly nobles; the Cromwellian rebellion in England was a class struggle, tradesmen and farmers being united for a brief time against the nobles and the clergy. Cromwell himself was a brewer; his chief aids were tailors, draymen, wine-coopers, carpenters, stokers, dry-salters, pedlars, linen-drapers, silk mercers, grocers' apprentices, linkboys, weavers, haberdashers, tinkers, shoemakers, and servants to private gentlemen. The hour had not yet come for the trading class to emerge into the direction of the governments of Europe.

Royal statescraft, by which kingdoms were won, not by warfare, but by royal marriages, culminated in the person of the Emperor Charles V, a Hapsburg ruler who reigned over more of Europe than any man since Charlemagne. Born in 1500 of a mentally defective mother, he was at best a man of mediocre ability, a pigmy in a giant's robe of empire. At this time Spain had begun her long course of national decay, started by the actions of Isabella of Castile, and her husband Ferdinand of Aragon, in expelling the Moors and the Jews from the land. Charles VIII of France (1483–1498), lacking the tricky shrewdness of his father Louis XI, ambitiously sought to acquire Italy for the French throne. Here he was met by Emperor Charles V, and the age of the Renaissance insensibly faded into the Reformations.

THE CHRISTIAN REFORMATIONS

The five great questions open between kings and popes were,

1. Who should select the rich bishops and abbots?
2. How far might kings tax fabulously wealthy church properties?
3. Could clergymen be tried by the king's courts?
4. Could the pope overrule the decisions of these courts?
5. How far could the pope, who claimed to be head of all governments, interfere with a country's rulership?

Philip the Fair of France, about 1300, had solved these matters, by having the papal throne moved into France; but within a century it returned to Italy.

Meanwhile, great critics of papal misgovernment arose within the church. John Wyclif (1320–1384), an Oxford teacher, who translated the Bible into English, was one of the earliest of these. Another critic, John Huss, a learned Czech, was condemned by the Church Council of Constance (1414–1417) for his lectures at the University of Prague, expanding Wyclif's teachings; and was burned for his impertinent criticisms of churchly rule. His colleague, Jerome of Prague, was burned to death the following year. In 1419 occurred an insurrection of the Hussites, or followers of Huss, in Bohemia—the first of the series of religious wars, marking the breaking up of organized Christianity. Five crusades against the insurgent Hussites failed, due to the enthusiasm of the reformers. Already John Ball, an English priest preaching native equality and the rights of man, had stirred England; and Wat Tyler, popular leader of insurgents, stirred by this teaching, had been assassinated by the mayor of London, in the presence of the young king, Richard II, in 1381. In 1358 France had been torn by the peasant uprising of the Jacquerie, with burning of noble chateaux and devastation of the country; within a century, Germany was swept by bloody peasant warfare.

Criticism of the church continued, largely because of the immense wealth which constantly flowed from European treasure-chests into the papal strong-boxes at Rome. During the reign of Charles V in Germany, Erasmus (1469–1536) was the most distinguished and influential of these reformers. He saw the two chief enemies of religion as revived paganism and superstitious Catholic observances, which had supplanted good works as the test of piety. In 1483 Martin Luther was born, son of a poor miner, educated to be a lawyer, rising from begging friar to be a professor at Wittenberg. When he was thirty-four, he confronted the pope, especially denouncing the papal habit of granting indulgences, or papal forgivenesses for crimes—obtainable at a price. Angered at the actions of the pope's representative in offering these indulgences to the people of Germany, Luther posted his ninety-five theses, or statements in opposition. These, translated into German, made the reformer a popular hero.

Tactless papal commands to the German princes angered them, and turned them to the support of Luther. The Emperor Charles V, in 1520–1521, held his celebrated Diet or Council at Worms, which condemned Luther, to the disgust of many Germans. While Luther, an opponent of disorder, sat quietly translating the Bible at Wartburg, his teachings began to be put into practice. Nuns and monks left their monasteries, and began to marry, to the scandal of the reactionaries among the Germans. The serfs arose in a terrible civil war, to regain their rights; Luther advised the rulers to put down the insurrection without pity, which advice was ruthlessly followed. The sect of the Anabaptists, in 1521, threatened Wittenberg, led by three "prophets." In 1525 they broke out into open insurrection, and for ten years they held the town of Munster, seeking to realize the idea of religious communism. Besieged by the Bishop of Munster, a sort of insanity came over them; cannibalism and polygamy were charged against them, and in the end, when their revolt failed, the leaders were tortured and executed. And, throughout Europe, the laboring classes were beginning to complain with more and more intensity against what they regarded as the oppression of their masters.

It must be emphasized that, in the last analysis, protestantism is anarchy in religion. It is man's insistence that no man has a right to interpret any religion, Christianity or not, for another individual: it supplants the organized church with the individual conscience, as the final interpreter of the Bible and the will of God. Its most extreme form appeared in the later Religious Society of Friends, or Quakers, who hold that only the "light within," the in-dwelling god, or the conscience, can direct any man as to his moral and religious duty. In practice, protestantism had all variations, between a dogmatic ecclesiastical system as rigid as Roman Catholicism, and the lax individualism of the Quakers.

Meanwhile, Zwingli, a Swiss reformer, was gaining followers; and Luther had been inexpressibly angered by their plan to abolish the Catholic Church altogether. The Emperor ordered the heresies to be suppressed; the minority German princes drew up and signed a Protest, from which our word "protestant" has come. The temporizing Augsburg Confession, drawn up by Melancthon, Luther's mild colleague, was in part disowned by the Emperor; and by 1555 the German princes had earned the right to choose between the Catholic faith and the Augsburg confession. In Switzerland, which had had a republican form of government since 1499, some of the cantons accepted Zwingli's protestantism, and some clung to the Catholic faith.

In Geneva, Switzerland, Calvin, born in France in 1509, originated Presbyterianism, which made its way into France and Scotland, and thence into the United States. England fell away from the papacy through the desire of Henry VIII, father of Queen Elizabeth, to divorce his first wife, the Spanish Catherine of Aragon, aunt of Emperor Charles V, and to wed a black-haired girl named Anne Boleyn. A special dispensation from Pope Clement VII had legalized the first marriage, of doubtful legality because of Catherine's former marriage to Henry's brother; nor could the timorous pope run the risk of angering the imperial nephew of the English queen. So the pope refused; and Henry made the clergy of England acknowledge himself as head of the English church, secretly married Anne, and had Parliament declare his marriage to Catherine void. The church persisted; the marriage had four successors, hardly of interest to history in general. Church of England historians hold that the English Church was older than the Church of Rome, and had hibernated during Roman Catholic dominance—an interesting and eccentric perversion of fact. In 1534 Parliament completed the revolt of the English Church from the pope, by permitting the king to appoint all the English clergy, and granting him the income which had formerly gone to Rome.

Henry of England did not accept the protestant views of Luther, Zwingli, or Calvin; he merely seceded from Rome, to enjoy legally the woman he desired. The lusty old ruler at length died, leaving his children to settle the questions of protestantism versus Roman Catholicism. Catholic Mary soon ascended the throne, directing a persecution in which

275 persons were put to death for denying the papal teachings. Protestant Elizabeth, her sister, followed her, and some 200 Catholic priests were executed. Christian was now wreaking on Christian the ancient blood-lust rooted in human hearts, a direct heritage from their ripping and slaying animal ancestry.

CHRISTIAN KILLS CHRISTIAN

The Jesuit Society, or Society of Jesus, founded by a Spaniard, Ignatius Loyola, in 1538, had become the most powerful Catholic organization in Europe, devoted to retaining the pope's autocratic power. The order was active in missionary work from the start, as the careers of Francis Xavier in Hindustan, the Moluccas, and Japan, and other Jesuits in Brazil, Mexico, Florida, and Peru, amply establishes. The son of Charles V, King Philip II of Spain, became the outstanding enemy to protestantism. His father Charles had turned the sanguinary Inquisition against the protestants of the Netherlands, executing here more than 50,000 of the population. When the nobles in 1566 protested to Philip against this, he sent the remorseless Duke of Alva, a figure of blind, measureless cruelty, to enforce his Catholic decrees.

William the Silent, Prince of Orange and Count of Nassau (1533–1584) was the chief opponent of the Spanish oppressors. At their instigation, he was murdered in 1584 in Delft. England's Elizabeth tardily prepared to send troops to the Netherlands, to aid the protestants there. At this, the enraged Philip sent his invincible navy, the Great Armada, against England. This was destroyed by storms and naval attacks. Decaying Spain formally acknowledged the independence of the Netherlands at the Peace of Westphalia, consummated in 1648.

Francis I, of France, was notorious for his massacre of 3,000 defenseless peasants dwelling on the slopes of the Alps, for their adherence to the simple Waldensian teachings. His son, Henry II (1547–1559), swore to exterminate all the protestants, and hundreds of them were burned. Henry's sons, the last three weak rulers of the house of Valois, continued these persecutions. Charles IX (1560–1574) began to rule at the age of ten, the power being in the hands of his mother, Catherine de' Medici, of Florence. The French protestants, or Huguenots, were harassed, a thousand of them being murdered at Vassy. On the eve of St. Bartholomew's day, in 1572, a fearful massacre of them took place in Paris, some 2,000 being slaughtered.

During the reign of Henry III, the last of the Valois, who had no heirs, a struggle broke out between him, Henry of Guise, and Henry of Navarre. The first two were assassinated, and Henry of Navarre ascended the French throne in 1589, a heroic figure among the effeminate French sovereigns. Two great ministers, Sully and Richelieu, aided the governments of Henry and his son Louis XIII (1610–1643). The despot Louis XIV (1643–1715), with his magnificent court at Versailles, became a patron of art and literature, to their great damage; and an aggressive attacker of parts of the Netherlands, Franche-Comté, and Lorraine. His reign marked the zenith of French power. He and his son Louis XV were noted also for their succession of resplendent mistresses. Under Louis XVI, the French Revolution broke out, and man's perspective was altered permanently.

The Catholics and Protestants of Germany fought out, between 1618 and 1648, the dreadful Thirty Years' War, the last open conflict between the rival religions. This began in Bohemia, an Austrian possession. On the protestant side Frederick, elector of the Palatinate, was chosen to head Bohemia, and lasted for a brief period. The protestant king of Denmark entered Germany, and for four years was worsted by the emperor's able general, Wallenstein. Gustavus Adolphus, king of Sweden, a protestant land since 1523, invaded Germany to oppose the Catholics, as well as to gain a strip of territory for himself. France, under Catholic Richelieu, who was more the shrewd statesman than the priest, allied itself with the protestants, and for a decade more four great powers ravaged stricken Germany. The complicated treaty of Westphalia, signed in 1648, gave rights to the German princes; some German territorial control to

Sweden; Metz, Verdun, Toul, and Alsace, except Strasbourg, to France; while the Netherlands and Switzerland were recognized as independent. A war of this nature differs only slightly from voluntary race-suicide; its effect in retarding civilization is beyond computation.

Far more important than the murderous destruction wrought by pope, emperor, king, and general alike, were the slow steps men took toward freedom and knowledge. The astronomical discoveries of Copernicus and Galileo, the philosophical advance made by the French Descartes and the Englishman Francis Bacon, were among the few solid achievements of the bloody age. A subtler thing was occurring: man was at last emerging from the shadow of oppressive autocracy, into that concept, largely modern, of a state composed of educated citizens, who are consulted about their own social destiny, rather than being driven like a herd of stupid brutes to the constant shearing for the glory of an earthly lord, prating of a more shadowy lord above him who has ordered and ratified the oppression and exploitation.

Political wars now replaced religious wars. Louis XIV of France inaugurated the ruinous War of the Spanish Succession, in which much of the known world participated. The skirmishing between French and English colonists in America, an overseas sideshow of the European conflict, is known as Queen Anne's War. In 1713 France, weakened by a long succession of reverses, agreed to the treaty of Utrecht, which scattered Spanish power broadcast. Philip V, the Bourbon, was allowed to retain Spain and her colonies, on agreeing that the thrones of Spain and France should never thereafter be occupied by the same ruler. Austria received the Spanish Netherlands, and Naples and Milan in Italy; Holland: certain fortresses; England: Nova Scotia, Newfoundland, the Hudson Bay region, and the rock and fortification of Gibraltar. These wars, scandalous in origin, evil in their prosecution, ruinous in their consequences, retarding and blasting civilization, knowledge, and its offspring progress, still occupy men's minds in Europe until the present day, and corrupt the minds of the world outside. It is strongly to be doubted whether man has yet achieved enough sane manhood to make the immediate future differ from the red recent past.

The 18th century marked the rule of many so-called enlightened despots, somewhat like the Greek tyrants, in that their autocratic rule in the main aided social life, although maintaining it servile and slavish. The rule of a wise, benevolent despot may furnish the soundest and most undisturbed government men may yet enjoy; but, since it lacks the essential benefit of popular education in collective enterprises, furnished by even an ill-managed democracy or republic, in the long run it is more costly to the people's progress than a fumbling popular government.

Peter the Great of Russia, who ascended the throne in 1672, visited Germany, Holland, and England, to learn the advantages of Occidental civilization. This rude, half-savage northern giant worked as a laborer in Dutch shipyards, engaged artisans throughout Europe, and in his vigorous amorousness shocked genteel Europe. On one occasion he quietly deserted the grand march of a ball given in his honor, to ravish the lovely princess he was escorting behind a curtain. Unconcernedly he returned to the march, leaving the princess to drown herself in the river flowing beside the castle. In addition to his constant amours, he made an outlet for Russia to the sea, and slowly accelerated the almost impossible task of making the backward Russians catch up with the rest of Europe.

PRUSSIA; THE PARTITIONS OF POLAND

In the 15th century, the German emperor sold the little electorate of Brandenburg to an unimportant house, the Hohenzollerns—the family which later gave to the world Frederick the Great, and the Kaisers Wilhelm, who helped plunge the world into the recent hell of the World War of 1914. Just before the Thirty Years' War, members of the family inherited Cleves and Mark, in the Rhine district, and won, far to the east, the duchy of Prussia, formerly the Baltic region inhabited by heathen Borussians.

In 1640 Frederick Wilhelm, the Great Elector, came to the throne. By his shrewdness he won, at the Treaty of Westphalia, the bishoprics of Minden and Halberstadt, and the duchy of Farther Pomerania, which opened the Baltic shore line to him. Keeping in mind his motto, that God perches above the banners of the strongest army, he constructed a military force out of all proportion to his resources, the early seed of the Prussian war machine which clawed the world's vitals in the 1914 conflict. His successor, Frederick, called himself King of Prussia; the boorish son of the latter, Frederick William I, spent his time hunting big game, smoking strong tobacco, selecting tall soldiers, and drilling his armed herd of death. He left his son, Frederick II, called the Great, both an ample supply of gold, and an army fit to pull down kingdoms.

Just a few months before Frederick the Great ascended the throne, the Emperor Charles VI, last in the direct male line of the Hapsburgs, died in 1740. His daughter, Maria Theresa, was left to inherit his wide miscellaneous dominions. Charles had induced the other European rulers to accept his solemn will, or "pragmatic sanction," in which he left everything to his daughter. Frederick, pretending friendship, marched into her territory of Silesia, and blandly occupied it. France joined Bavaria in an attack on the queen; she had to cede Silesia to Frederick, to prevent his joining her enemies. England and Holland joined in an alliance to prevent France from annexing the Austrian Netherlands; and in 1748, a hundred years after the peace of Westphalia, the kings laid down their arms, and the War of the Austrian Succession was over. There were no gains by any contestant; things were simply restored to their status before the war: except, of course, that property destroyed forever and men slain could not be restored to their previous state. Frederick, of course, retained Silesia.

Maria Theresa was by no means pleased with this; and began making plans to expel Frederick from the purloined territory. This led to a war entangling the whole world in its destructiveness, from the rajahs of Hindustan to the colonists of New England and the Carolinas—the Seven Years' War, 1756 to 1763. France was shrewdly persuaded to ally herself with Austria against Prussia; Russia, Sweden, and Saxony joined in their attack. Learning the aims of his enemies, Frederick struck before war was declared, occupying Saxony, and moving onward into Bohemia. He defeated the Austrians decisively at Breslau, which caused the Swedes and Russians to retire.

Meanwhile, England locked with France in a desperate conflict, leaving Frederick to face his other enemies more evenly. His kingdom was split apart by West Prussia, belonging to Poland. Poland, except for Russia, was now the largest kingdom in Europe, a loosely knit land of Catholic Poles, protestant Germans, Greek Catholic Russians, and many Jews. Her execrable government was little more than a feudal anarchy, with weak kings hobbled by veto rights retained by the nobles. Each king was elected, usually from some foreign people; and the great nations intrigued to control these elections for their own interests. There were 1,500,000 of these nobles; so poor, that the saying was that the poor noble's dog, even if he sat in the middle of the estate, would have his tail upon a neighbor's land. There was practically no middle class; the peasants were lower than serfs, over whom the nobles had the power of life or death.

Russia was ruled by the celebrated Catherine II; she, Frederick, and Austria, agreed, in 1772, each to take a slice of the powerless Polish kingdom. Austria took a strip inhabited by nearly 3,000,000 Poles and Russians; Prussia received the desired West Prussia, which welded its realms together; Russia, an eastern portion, inhabited largely by Russians. Poland, bitterly lessoned, in the ensuing twenty years had a great revival in education, art, and literature. Troubled at this progress, the three robber powers agreed to a second partition in 1793: Prussia cutting deep into the land, and stealing 1,500,000 Poles, including the towns of Danzig, Thorn, and Posen; Russia taking 3,000,000 people; and Austria being content with a promise that the two other raiders would try to secure Bavaria for her, in exchange for the Austrian Netherlands.

The Poles found a leader in the audacious Kosciusko, who had fought under Washington for American independence. In the spring of 1794 this patriot sprang his plans for an insurrection, which forced Prussia to withdraw. But Russia's vast power crushed the uprising. Kosciusko was wounded and captured in battle, and within a year Russia held Warsaw. The Polish king had to abdicate; and the dismembered torso of a kingdom, in 1795, was divided, amid bitter disputes, between the three great national highwaymen. Russia, in the three partitions, received about twice the combined shares of her accomplices.

The ancient house of Hapsburg, with its capital at Vienna, had been gathering, by conquest or inheritance, the vast territory it held up to the war of 1914. Ferdinand I, son of Charles V, acquired by a shrewd marriage Bohemia and Hungary, although the Ottoman Turks held much of Hungary at the time. For nearly two centuries Venice and the Hapsburgs had been fighting the Ottoman menace; the Moslem failure to win at the siege of Vienna in 1683 marking the beginning of the Turkish decline. In 1699, the Sultan formally recognized Austrian control over Hungary and Transylvania. In the end the mixed Austrian possessions included control over Germans in Austria proper; over the Slavic Czechs in Bohemia and Moravia; over Poles in Galicia, Magyars or Hungarians in Hungary, Roumanians and other peoples in the same territory, Slavic Croats and Slovenes in the south, Italians in Milan and Tuscany, and Flemish and Walloons in the Netherlands. Maria Theresa and her son Joseph II (1780–1790) ruled this squabbling litter of races with much ability; but their bickering continued, until in the end a minor conflict between Austria and neighboring Serbia set the match to the World War explosion in 1914.

THE EIGHTEENTH CENTURY: THE PEOPLE GROAN

When William and Mary by invitation took the English throne in 1688, England thereby settled its two festering problems. The nation showed that it had determined to remain protestant; and the relations between the Church of England and the Dissenters were being smoothed out. This was the first settlement; and, secondly, the king's powers had been clipped, and since that time no English monarch has dared to veto an act of Parliament. Under Anne, William's successor, England and Scotland were finally united, with the Scotch and English houses of Commons and Lords being joined. Hereafter united Britain is properly called Great Britain, instead of England. Wales had long been annexed; in 1801 Ireland was formally taken over, causing the kingdom to be called the United Kingdom of Great Britain and Ireland. In popular speech, this is what England means today.

None of Anne's seventeen children survived her; the nearest protestant heir was George I, elector of Hanover, a stupid German princeling, fond of his mistresses and his beer, and ignorant of the English language, and of any worthy idea or ideal as well. European cities, such as Leeds, Manchester, Birmingham, Liverpool, Amsterdam, and Hamburg, began to thrive, growing fat at the expense of India, China, and Australia. Since 1607, the date of the settling of Virginia colony by England in North America, the continent had been held largely by England, with a thin slice owning allegiance to Spain at the bottom, and a French fringe at the rear and the top. We may ignore the brief small Dutch settlements along the Hudson River, and the Swedish settlements along the Delaware; these became English in time. America was settled by refugees—Puritans, Separatists, Catholics, Quakers, who exiled themselves to enjoy unmolested their particular varieties of Christianity; as well as by some cavaliers and men jailed for debt.

In addition to French and English rivalry in North America, India furnished these two nations another battling ground. In 1639, under Charles I, the English East India Company purchased a village on the southeastern coast of Hindustan, which slowly evolved into the important station of Madras. Posts were also established in Bengal, and later Calcutta was fortified. Bombay had already admitted English suzerainty; before the end of the 17th century, hostilities broke out between the Mongolian empire and the newcomers. France also had an East India Company, with Pondicherry as its chief center in 1700, holding a population of 60,000, of whom only 200 were Europeans. The Great Mogul, it soon developed, constituted no menace; the Portuguese and Dutch, who also had settled, showed no power; so native princes, French, and English were left to fight it out for the ancient wealth of the vast hot peninsula.

During the War of the Austrian Succession, English and French fought in India. The energetic French governor, Dupleix, proposed to drive the English out of Hindustan. French and English began to engage and drill native soldiers, called Sepoys. A mere English clerk in Madras, named Robert Clive, organized his own band of Sepoys, riveted to him by admiration for his great bravery; Clive soon showed himself more than the equal of Dupleix. The nawab of Bengal at this time committed the outrage known as the "black hole of Calcutta," imprisoning 145 Englishmen all night in a small room, so that most of them died by morning. At Plassey, near Bengal, Clive smashed the nawab's vastly greater force. Before the war was over, the English had gained Pondicherry, and had begun to grasp at northern India.

The obtuse harassments of George III, a king who tried to revive the "divine right of kings" doctrine of the expelled Stuarts, drove the thirteen American colonies to revolt against the greedy mother country. Vexatious taxation without colonial representation, annoying shipping and trade laws seeking to confine American colonial trade to English ships rather than colonial ships or those of any other power, and to prohibit the manufacture of certain articles entirely, drove the colonists to the verge of revolt. This trouble grew out of the pernicious "mercantile theory of commerce," by which a nation's wealth was supposed to be measured by its stock of gold; so that each nation sought to buy nothing and sell much to rival nations, and used its colonies to sell manufactured products to at a high rate, while it bought from them only raw materials at a low rate. The problem of where the colony was to secure the gold to pay the difference never entered the muddled heads of the economists who propounded this theory. So America was put upon the rack of the mercantile theory by England: and the irritation over the short-sighted tyranny grew throughout all the colonies.

England, troubled by colonial protests, at length withdrew all taxes except a low one upon tea—a tax made so low that tea, with the tax paid, could be purchased in the colonies more cheaply than tea smuggled out of Holland. But cheap tea through the regular channels threatened to end the livelihood of a group of powerful colonial tea-smugglers centered about Boston. In 1773, a British ship was boarded in the harbor, and its cargo of tea dumped overboard. The Englishmen Burke, Pitt, Fox, and other distinguished leaders attacked the king's oppressive anti-colonial measures at home; and in Philadelphia, in 1774, delegates of the colonies united against the homeland menace. In 1775 skirmishes at Lexington and Bunker Hill heartened the colonists, who selected a staid Virginia planter named George Washington to lead them. In July, 1776, the colonists in congress assembled announced the innate right of oppressed men to secede, and declared their independence.

France, displeased with England after the outcome of the Seven Years' War, wished to aid the colonists, but hesitated until the colonial victory over the English general Burgoyne, at Saratoga, in 1778, indicated a probability of ultimate colonial success. The Americans lost repeatedly, but in the end cornered the British general Cornwallis on a narrow peninsula at Yorktown, Virginia, and forced his surrender.

England then recognized the independence of the new United States of America, whose territory reached from the Atlantic seaboard to the Mississippi. The lands beyond the Mississippi, and Florida in the south, still remained in the hands of Spain. This country and Portugal held their American possessions a few years more; but in the end all but a few islands, small, insignificant colonies, and the chilly stretch of northern Canada, were free of European dominance. This Revolution in the colonies, of course, was not a popular democratic movement, but a movement of the native leaders to throw off foreign leadership. With this revolution, the

Middle Ages come to an end, and the age of imperialistic capitalism comes into being.

The medieval period witnessed two of the most imposing threats from the Orient, the initial sweep of Islam, and the great Mongol overturns midway of the period. It saw, in the beginning, Europe sunk in superstition; saw superstition increasingly attacked, after the classic pagan cultures reached Europe; and saw science open the way for the industrial civilizations of today. The important achievements were in science, industry, and the arts; but the pervading darkness of the centuries was caused by the twin forces of churchly superstition, and the costly warfare that bloodied the continent, and the world it increasingly dominated, during the whole era. This warfare had been largely an expanded series of feuds between grasping royal families; from now on, more and more the strife will be marked by uprisings of the oppressed majority, who are slowly groping toward full cultural manhood. The rivalry of the great imperialistic nations is no more than the artificial rivalries between the Blues and the Greens in Byzantium; there is nothing artificial about the upward reach of the suffering majority of men.

ADDITIONAL READINGS

MUHAMMAD. *The Life and Teachings of Mohammed, a Short History of the Saracens,* by Ameer Ali, is an excellent though over-friendly account of the rise and spread of Islam.

THE PAPACY. *A Complete History of the Popes of Rome,* by Louis Marie de Cormenin, is complete, brilliantly told, and authoritative.

EUROPE. *The History of Civilization in England,* by Henry Thomas Buckle, is the best survey of medieval history in the half dozen more important European countries during this period. England, France, Spain, and Scotland are treated exhaustively.

ENGLAND. *The History of England,* by Thomas Babington Macaulay, is the most readable book on the subject—scintillating, rather than always authoritative.

FRANCE AND EUROPE. The *History of Civilization in Europe* and the *History of Civilization in France,* by Francois Pierre Guillaume Guizot, are readable classics of historical research.

III. The Reawakening of Civilization

MAN AWAKES IN FRANCE

The 19th and 20th centuries have been marked by two great forces: the wage enslavement of civilized man by the employing class; and an imperialistic spread over the rest of the world, in the search of markets for surplus products denied to labor at home, on the one side: and the uprisings of the people against vestiges of feudalism and exactions of capitalism, on the other. The awakened spirit of knowledge, flowering in the pagan Renaissance, awoke the spirit of doubt or scepticism, out of which the Reformation grew; and the spirit of scientific inquiry, out of which the revolutions of 1789, 1848, 1870, and 1917 grew. Primitive and medieval religions, Catholic and Protestant alike, had taught that man, originally good, had been rendered vile by Adam's fall; thinking men, animated by scientific scepticism, began to urge that man was by nature good, and that the use of his reasoning powers upon nature's mechanisms would allow him to better his lot upon earth, once he freed himself from the shackles of error and superstition.

England developed scepticism first; and here all the great Frenchmen of the late 18th century visited, and learned the blessings of a land not ridden by kings who prattled of God's selection of them. Voltaire was the most brilliant of these; Diderot, main spirit of the sceptical French *Encyclopedia,* and Rousseau, a sceptical sentimentalist, were his chief aids. The medieval customs surviving in the France of the late kings, such as despotic rule, arbitrary imprisonment, unfair taxation, press censorship, serfdom, feudal duties, and the conflict between church and state, are called in France the old régime. Many sections or departments of France had heavy customs duties against their neighboring departments. The tax on salt, for instance, varied enormously, and fell with punishing severity upon many prosperous sections of the land.

The nobility and the clergy were exempt from the heavy *taille,* and other troubling taxes. The higher clergy were tremendously wealthy; while the lower clergy, who did the actual work, hardly received enough to keep life in their bodies. Noblemen could collect part of each peasant's crops; they were often allowed a monopoly on mill, wine-press, and oven, as well as of hunting, and of the higher offices in the army and church, and those about the king's household; they even owned a right of collecting toll upon sheep and cattle driven past a nobleman's house. Many of these nobles were men newly rich, who had purchased their titles. With these titles they purchased such oppressive rights as the power to enjoy a peasant bride, the night of her marriage; and the more hideous right of having their feet warmed, in winter, by having a peasant disemboweled and the lord's feet placed in the exposed pluck of the breathing victim. Not that France led continental Europe in misery, but because she led it in scepticism, did the revolt first come there.

Louis XVI thus described his power:

> The sovereign authority resides exclusively in my person. To me solely belongs the power of making the laws, without dependence or cooperation. The entire public order flows from me, and I am its supreme protector. My people are one with me. The rights and interests of the nation are necessarily identical with mine, and rest solely in my hands.

The king sought to rule "by the grace of God," as his grandfather Louis XIV had done. Yet the French courts of law, the *Parlements,* began to hamper the king's despotism, by protests at least; and the 18th century saw outspoken criticism throughout the land against the increasing oppression. Turgot, Necker, and Calonne, the king's successive ministers, unconsciously speeded the process of revolution. In 1789 the land, due to wasteful extravagance, was on the verge of bankruptcy; and Calonne reported that the *Notables* must be summoned, to devise some way of saving the state. This may be said to mark the beginning of the French Revolution.

The Notables, bishops, archbishops, dukes, judges, and high government officials, who were first summoned, were partly representatives of the people, since they were not merely the king's grovelling courtiers. They refused to ratify Calonne's wide reforms, and he and they were dismissed. The king referred the problem to the *parlements;* and the *parlement* of Paris resolved that only the Estates General, the nation itself in assembly, could handle the predicament. On May 1, 1789, the Estates General was summoned to meet. This had not met since 1614; its feudal arrangement then gave clergy, nobility, and the third estate—the people at large—each a separate voice, meeting in three separate houses. Although Necker gave the third estate twice the number of delegates of either of the other houses, he would not order the three to meet together; and the angered Third Estate, on June 17th, after its invitation to the others to meet with it had been ignored or refused, announced itself a "National Assembly"; and by the famous "Tennis Court oath" its members agreed to come together whenever circumstances required, until the constitution of the land was established.

The ill-advised king dismissed Necker, who had been recalled, and summoned out his Swiss and German troops. Mobs arose, one on July 14th sacking the Bastille, a vile old prison. Here they killed the guards, and freed the seven captives. A National Guard was formed, and the local governments of Paris and other cities were replaced by democratic Communes. The provinces caught the contagion; and the frightened Assembly began knocking over the old abuses at a panicky rate. On August 26th a bill of rights of individual citizens was drawn up, containing such epochal and, as yet, unrealized generalities as:

> Men are born and remain equal in rights. . . . Law is the expression of the general will. Every citizen has a right to participate, personally or through his representative, in its formation. It must be the same for all. . . . No person shall be accused, arrested, or imprisoned except in the cases and according to the forms prescribed by law.

It went on to provide for toleration of religious opinions, free speech and writing, free press, taxation only by representation. Kings and rulers in all lands, it is time for you to tremble on your blood-cemented thrones!

The king hesitated about signing this: a mob led the royal family, "the baker and the baker's wife and the baker's boy," as they were scornfully called, from Versailles into real imprisonment in the Tuileries in Paris. The church was powerful, because of its riches: remove the riches! On November 2nd, 1789, a decree was passed taking over all ecclesiastical wealth; moreover, the church was taken over, and democratized, priests being elected by popular suffrage. So far we have had a revolution comparatively peaceful: it is time for blood to stain the page. The powers of western Europe turned on king-chained France; and the Reign of Terror came in.

The higher nobles emigrated across the Rhine and elsewhere, and planned an invasion of France. In June, 1791, the royal family sought to flee from France. The Assembly pretended that the king had been merely kidnapped; but a republican party for the first time appeared. King and queen were apprehended at the border, and returned. In October, the regular Legislative Assembly met. Leopold, brother of the queen, Marie Antoinette, of the Austrian ruling house, invited Russia, England, Prussia, Naples, and Spain, to aid him in restoring kingship to France. On August 27th he and the king of Prussia issued the famous Declaration of Pillnitz, publicly offering to aid the European monarchies in restoring monarchy to France. The extremists began to control Paris; the Jacobin society of fanatics grew strong. The emigrant nobles, if they did not return, were treated as traitors, subject to death if caught. Non-accepting clergymen were exiled from France. In April, 1792, harried on by the Assembly, France declared war on Austria—the beginning of the struggle of Europe against France, that was to stretch out for a score of years.

Prussia joined Austria; the two kings threatened to destroy Paris if the king was harmed. A Paris mob drove the king, for safety, into the Assembly building; the Assembly joined with the Commune in desiring a republic. On September 21st, the constitutional convention, summoned by the Assembly, made France a republic. The jails were packed with citizens supposed to be nobles about to emigrate; on September 2nd and 3rd hundreds were executed, with hardly a one-sided trial. The Austrians had crossed the boundary; on September 2nd they took Verdun. The outlanders fumbled, being concerned with their division of Poland. The French troops invaded Germany, the Austrian Netherlands, and Savoy. What should be done with the king? Off with his head! So the Assembly decided, by a small majority; and on January 21, 1793, he mounted the scaffold, and lost his head. On February 1st the exultant Assembly declared war on Great Britain.

Russia joined the coalition against liberated France; then Spain, and the Holy Roman Empire. The Netherlands were lost; the leading French general, Dumouriez, deserted to the enemy. Panicky France put all power into the hands of nine, and then of twelve, of the Assembly, who were called the Committee of Public Safety. The Assembly split: the moderate republicans, or Girondists, chiefly from Bordeaux, lost control to the party called the Mountain, the vigorous and uncompromising republicans. The Girondist leaders were put under arrest June 2, 1793; the peasants of La Vendée and Brittany in general became royalists, rising in arms against the National Guard. Marseilles and Bordeaux revolted against the Mountain and the Paris Commune; Lyons, deprived of its market for luxuries to the high church officials, followed suit. Lyons was bombarded, captured, and the anti-Mountain forces treated with utter savagery. Bordeaux and Marseilles, terrorized, admitted the troops of the convention. Carnot, the convention's military organizer, raised 750,000 troops, and sent them against the warring European enemies. England, Hanover, Austria, were driven back. The end of 1793 saw France safe, for the time at least, from invasion.

The Revolutionary Tribunal was established in Paris, to cow by bloodiness. In October, 1793, Marie Antoinette was executed; other zealots for the royalist cause followed her to the guillotine. Revolt was crushed with an iron might: thousands in Nantes were shot down or drowned, and the great city of Lyons was almost wholly destroyed. Danton, a fiery republican, blanched at the republican excesses; by this time an actress, as the Goddess of Reason, had been worshipped at the altar, with all gods and god-mother-virgins abolished. Robespierre became leader, executing both Danton and the leader of the cult of Reason worship. On July 27, 1794, a coalition against him ordered his arrest; and at last the worst excesses were over.

THE ABSOLUTE ON HORSEBACK

Napoleon Bonaparte, whom the stern philosopher Hegel called the "Absolute on Horseback," now came to the front. A descendant of Italian ancestry in Corsica, he was made, by the Directory of five men who now ruled France, commander-in-chief of the Army of Italy, in 1796. The European allies against France had withdrawn, except England, Austria, and Sardinia. Napoleon faced the last two of these; he isolated Sardinia, and forced it to make a separate treaty. Then he turned against Austria. Capturing Mantua, held by Austria, by a shrewd siege, he marched almost to Vienna, and forced Austria to make peace. Austria ceded its Netherlands to France, and secretly promised to aid France in securing the left bank of the Rhine; it also recognized the republics established by France in northern Italy, and in return received Venice and the Venetian possessions.

Returning to Paris, the shrewd young Corsican persuaded the Directory that he was needed against Egypt and India, foreseeing that the forthcoming European attack would cause him to be recalled to France as national savior. And so it developed. Napoleon defeated the Turks in the battle of the Pyramids; while Nelson defeated the French fleet, and at the first battle of the Nile wiped it out, divorcing Napoleon from Europe. After ups and downs, learning that the moment had come in France, Napoleon and a few officers secretly escaped to France, on October 9, 1799, and a month later, by a conspiracy or *coup d'etat* (a stroke of state) overthrew the corrupt Directory entirely. The real power was now in the hands of the Corsican.

The "yes" and "no" vote established Napoleon as First Consul, supreme in France. He found France at war with England, Russia, Austria, Turkey, and Naples. Emulating Hannibal, Napoleon crossed the Alps, fell on the Austrians at Marengo, and routed them. Within a year Austria was humbled; and by the end of 1801 all the powers had signed peace treaties with France. The Holy Roman Empire was gutted, the ecclesiastical states being turned over to lay princes deprived of their hereditary lands elsewhere by France. Meanwhile, Napoleon was tireless in carrying out internal reforms. The Bank of France was founded; the First Consul stabilized the currency of the land. Sunday, once abolished, was restored, and clergymen put on an equal footing, whether they had sided with or opposed the Directory. Pardons to the nobles were in Napoleon's own hands; and in April, 1802, a general amnesty in their favor was declared. Most of all, the miscellaneous laws were codified into the imposing Code Napoléon, still used today in France, Rhenish Prussia, Bavaria, Baden, Holland, Belgium, Italy, and even in the American state of Louisiana.

By 1802, the Consul had himself given life power, with the right to name his successor. In May, 1804, he acquired the title of Emperor and in December he was crowned as the successor of Charlemagne in the cathedral of Notre Dame, with all the outworn military pomp. One of his first steps was the establishment of a new nobility, the Legion of Honor, to replace that abolished in 1790 by the first National Assembly. The autocrat in him grew lush and rank, like a poisonous weed. He had already suppressed many of the political newspapers, and had forbidden any new ones. Now the papers were restricted to news furnished by the Emperor's police, omitting anything that might wound the sensitive tyrant.

War became his shrewd policy. Each day's delay dimmed Europe's remembrance of its harsh defeats at his hands, and dimmed also France's recollection of its triumphs under the Corsican buccaneer. As he worded it,

> France must be the first among the states, or she is lost. . . . In our position I shall look upon each conclusion of peace as simply a short armistice, and I regard myself as destined during my term of office to fight almost without intermission—

as hideous an anti-social policy as any wholesale murderer ever enunciated. In 1804 he said,

> There will be no rest in Europe until it is under a single chief—an emperor who shall have kings for officers, who shall distribute kingdoms to his lieutenants, and shall make this one king of Italy, that one of Bavaria; this one ruler of Switzerland, that one governor of Holland, each having an office of honor in the imperial household.

Such was his slave-driver's ideal; and now he found himself able to make his dream come true, in his iron-heeled dominance over an abject continent. Europe did need the uniting he dreamed; but only as a voluntary, peaceful union could this be worthy or endure.

Peace had been concluded with Great Britain at Amiens in 1802; in 1803 war was renewed, not to be ended until the emperor was a captive. Hanover, whose elector was an English king, was occupied; Holland, Spain, Portugal, and the Ligurian republic were badgered into allying themselves with the French. The emperor's troops and flatboats were collected at Boulogne, just across the Channel; England was terrified at the threat of an armed invasion, hazardous though this might be to the reckless foe.

To meet this, Russia under Tsar Alexander I, Austria, and Sweden joined with Great Britain by July, 1805, to face the emperor, newly crowned king of Italy, annexer of the Ligurian republic, and who, as rumor had it, was about to annex Austria's Venetian territories. Austrian Ulm capitulated in October, and before the next month was half over Vienna was in the hands of the French. In the frigid winter battle of Austerlitz, in December, Austria and Russia were defeated, and forced to sign humiliating treaties.

One of the Corsican's aims was to blast Germany's power by disintegrating it into independent fragments. His recognition of the independence of certain German powers ended the further existence of the Holy Roman Empire, whose emperor, Francis II, abdicated on August 6, 1806. The ex-emperor of the empire took the title of Emperor of Austria, at the time that Napoleon assumed the Protectorship of the Confederation of the Rhine, composed of southern German states. Napoleon further named himself king of Naples; made his brother Joseph king of Naples and Sicily; his brother Louis king of Holland; his brother-in-law Murat duke of Cleves and Berg. The man on horseback was driving his hoofs through the ancient dynasties, and leaving them battered and subservient behind his roaring march of triumph.

Prussia, which so far had held off, was taunted into war with France; the defeat at Jena, in 1806, left Prussia at the conqueror's mercy. Yet England remained uncowed; and at Trafalgar, off the coast of Spain, Nelson annihilated a second French fleet. To keep France contented, Napoleon energetically improved the land, with marvelous roads crossing the Alps and skirting the Rhine, with beautification of Paris, with a reorganization of education. Yet his ambition sickened, because he could not name himself son of God the Father, without having even the lowest fishwives hiss him. Human victory was not enough; in his madness, he aspired to replace Jesus as man's deity.

Spain was laid low, and reawakened Austria was crushed again at Wagram. In 1812 the rising war lord started with an army of 400,000 men against vacillating Russia. The battle of Borodino, and the devastations of a Russian winter, killed three-fourths of this army before it entered Moscow, which Napoleon found gutted with fire by the Russians before the French approach. Prussia, reorganized democratically after its defeat at Jena, allied with Austria and Russia, hurled down the conqueror at the "Battle of the Nations," near Leipzig, October 16–19, 1813. The allies took Paris, and the Corsican, allowed derisively to retain his title of

Emperor, had his domains withered to the tiny island of Elba, where he remained a virtual prisoner.

Within a year he escaped, returned to a tepid France, and marched against England under Wellington and Prussia under Blücher at Waterloo. Again he lost. This time he was banished to the remote island of St. Helena, where he brooded over the eclipsed glory, and labored over his memoirs, seeking to justify his vaulting ambition which had so salutarily overleapt itself.

The Congress of Vienna, in 1814, dominated by Austria, Russia, and Prussia, with the astute French Tallyrand, the shrewd Austrian Metternich, as preëminent figures, divided Europe to suit themselves. These powers, with England, in November, 1815, entered into the secret Quadruple Alliance to preserve the order of Europe. Germany was not allowed to form a strong national government, but even here some improvement was made. The Spanish colonies in America, led primarily by the patriot Bolivar, liberated themselves from weakened Spain, a sicker fragment of weakened Europe. Italy, under the Austrian heel, made some progress toward freedom, guided by the republican patriot Mazzini.

France, after Napoleon fell, accepted the choice of the allies, the Bourbon Louis XVIII, an easy-going compromiser, who left much of Napoleon's statesmanlike reorganization intact. The king's constitution, the *Charter,* granted equality before the law to Frenchmen, personal and religious liberty, and equality of taxation. Louis's successor, Charles X, attempted to restore the autocracy of the earlier Bourbons; he was overthrown, and Louis Philippe, an Orleans Bourbon descended from Louis XIII, was called to the head of the state. The new ruler professed democratic views, and acted like an autocrat. In 1848 a mob stormed the Tuileries; and a provisional republican government was established. The "red republic" of the social democrats strove against the liberal republic which had thrust itself into power; and out of the turmoil the nephew of Napoleon, Louis Napoleon, was elected by the people as president of the republic. In 1852 this Napoleon established the second empire, with himself

"Emperor of the French by the grace of God and the will of the people." Thus the reign of the autocrats came down to the middle of the century, with constant uneasiness among the oppressed lower classes. Moreover, in 1829 Greece won its independence from Turkey; and Belgium freed itself in 1830 from Holland.

THE MODERN RENAISSANCE IN INVENTIONS

Man is still floundering in the political Dark Ages of ruling class greed, which manifests itself in capitalistic warfare. Up to 1900, every important war had ended in a new alignment of the rulers, or a popular uprising terminating in some new oppression, under the name of emperor, king, or president. Yet war is little more, in its importance to the story of man, than would be the murder which ends the active career of some public-spirited scientist, industrial organizer, or artist. The narratives of wars no more constitute the history of man than an account of the murder of Julius Caesar would be the complete story of the high-visioned activities of the great Roman. The peacetime activities are the story; the wars are the temporary and harmful interruptions to man's progress.

Perhaps, in the still unrealized future, war may be outlawed as thoroughly, and become as rare, as armed conflicts between states of the United States have become; or as rare as duels and resulting murders among members of the Congress of the United States of America, or among commoners and lords in the Houses of Parliament in England. Today, war is as alive as tuberculosis or cancer. Its germs are in every man's heart and mind, and dominate those destructive overlords in politics and industry who sit in the saddle of every civilized and uncivilized land. Man today needs to know something of these fatal germs and their activities; it is necessary to speak of Napoleons and Wellingtons, of Jena and Austerlitz, in order that man may recognize these red footprints of the bloody past.

But the peaceful progress of man is the real story of mankind; and it is a relief to turn from the loud alarums of battle to the modern renaissance in inventions, and the ensuing industrial revolution, to find at last positive steps in man's advancement. We will find this part of the story packed with sufferings and cruelties, with greed and mass oppositions: but its effect is actual progress toward civilization; and the hemorrhage of war is a reversion to mass barbarism or savagery.

Man's function collectively is to tame his environment to his service, and to share the profits of this domestication among all men. The factors of geography, as we have seen—climate, rainfall, periodic water supply, plus protection from attack furnished by natural boundaries such as deserts, oceans, mountain ranges, and jungles—largely controlled the earliest civilizations. Increasingly, as man learned to control geography—by heating and refrigerating systems, irrigation, railroads, steamship lines, canals, and tunnels—another factor grew in importance, until it became all important: the economic factor, or the methods of industrial production and distribution in the country involved.

When the modern renaissance of inventions began its wholesale alteration of the living conditions of the past, man's achievements in the field of production of commodities spread rapidly over the civilized world. Misarrangements in the field of the distribution of these commodities, causing periodic gluttings of the home market, and requiring a foreign market to dispose of products which cannot be socially assimilated at home, because of the limited wages paid to the actual producers—such misarrangements in distribution have given birth to imperialism, or the theft of the uncivilized world by the grasping civilized rulers, the industrial overlords, acting through their political representatives. Answering the oppressive system of distribution has come the awakening of the actual producers, the working classes; and their assaults upon intrenched privilege constitute the second dominant tendency of the present centuries. The keynotes of today are capitalistic imperialism and the uprising of labor.

We have called this the modern renaissance in inventions; for inventions are no new thing in human history. Savage man achieved his slow essential early inventions; the philosophical scientists of classic Greece, the craftsmen of ancient cultures, the thoughtful minds of China, Islam, and the artistic Renaissance, perfected ways of doing many things. But the modern renaissance in this field has, in less than two centuries, upset man's method of living completely. Up to a hundred and fifty years ago, most of the dominant industries were domestic: that is, they took place in the home. Food products were raised by agriculture and the tending of animals, and were prepared for the table, in each individual home; thread was made, and cloth woven, in the home; and even those crafts which became specialized, such as shoemaking, and the manufacture of pottery, crockery and glassware, and metal work, were really manu-facture, or handmaking, performed, not by machinery, but by a small group of master craftsmen and apprentices, who still kept at their domestic activities in other fields. Then the renaissance of inventions came. All of these industries have reached the point where they are performed by groups of thousands and tens of thousands of working men, women, and children, in vast factories and mills. This broadening hegira or flight from the home to the factory alone explains modern civilization, with its bustling cities, its titanic factories with whirring machinery giants, its world-embracing commerce and industrial fortunes, its labor unions and labor parties. This modern chapter in man's progress is the most revolutionary part of the whole story.

Take cloth-making, as a typical essential industry. This requires spinning the thread, and weaving it into the cloth desired. Up to 1767, the same method had been used for thousands of years—a simple way of spinning thread, allowing a person to make only one thread at a time. In 1767 James Hargreaves, an English spinner, invented the spinning jenny, which permitted a single workman at his spinning wheel to spin eight to ten threads, and thus do the work formerly done by eight or ten separate persons. This invention, and an improvement by Arkwright, resulted in Samuel Crompton's invention, in 1779, of the mule, combining the spinning jenny and the roller machine; and bv the end of the century power-driven machines had been invented, permitting the spinning of 200 threads at a time, by a machine watched by only one or two workingmen.

The enormous output of thread forced man's ingenuity to improve the weaving process. A Kentish clergyman named Cartwright, in 1784, invented a new and improved loom, which altered the whole current of weaving. Today a machine watched by one workman can do as much weaving in a day as several hundred weavers could do with the old-fashioned hand loom. Once it took months to bleach goods, by using sunlight; today, the use of acids completes this process in a few days. The cotton gin, invented by Eli Whitney in the United States in 1792, applied the machine to the removal of seeds from cotton, and thus sped up this process of production enormously. The effect upon commerce was astounding. In 1764 England imported a mere 4,000,000 pounds of raw cotton annually; by 1841, she was using nearly 500,000,000 pounds a year. By 1820, 1,000 workmen could do as much with the new machinery as all the operators in Scotland could formerly do without it.

Two things were needed: a strong substance to compose the machinery, and a greater power than man's to run it. Iron and steel filled the first requirement; the invention of the steam engine satisfied the second. Windmill and water-wheel had long been used; but the power in wind and water was too uncertain, rare, and difficult to transport, to satisfy the need. James Watt, an instrument maker of Glasgow, took the steam pumping-engine used to pump water out of the recently opened coal mines, and found a way to make it furnish the power for the new machinery. In 1785 the first steam engine was used in a Nottingham cotton mill.

Transportation was the next essential. By 1804, Trevithick used the Watt engine on a locomotive; in 1830 the first railroad line, between Liverpool and Manchester, was opened up; and Stephenson's "Rocket," pulling a train weighing 13 tons, achieved a speed of 44 miles per hour. In 1784 Fitch, and in 1793 Fulton, invented steamboats; Stevens invented the screw propeller in 1804. The Firth of Clyde canal, as early as 1802, saw the steam-driven *Charlotte Dundas* on its waters; Fulton's *Clermont,* in 1807, travelled up and down the Hudson River from New York City. The American-built *Savannah* left its name city in 1819, and was the first steam-driven ship to cross the Atlantic, arriving in Liverpool in 26 days. The modern *Mauretania* established the record of 4 days, 10 hours, and 41 minutes, between New York and Queenstown. On short runs, trains in the United States have reached a speed of 120 miles per hour. The airplane, invented by Wilbur and Orville Wright, two Americans, in 1903, reached a speed, in the 1926 Schneider cup races held at Hampton Roads, Virginia, of slightly more than 246 miles an hour. The most dramatic flight was the non-stop trip of Charles Lindbergh, in 1927, between New York and Paris, in which 3,600 miles was covered in thirty-three and one-half hours, by the venturesome, unaccompanied flier.

These are inventions only in the three fields of cloth-making, power, and transportation; every human activity can show as much progress. The invention by Morse of the electric telegraph in 1835; of the typewriter, by Sholes, in 1873; of the telephone, by Bell, in 1876; of the talking machine and incandescent lamp, by Edison, in 1877 and 1878, and of the motion-picture machine by the same inventor in 1893, are among America's contributions; the Voltaic pile, by Volta, in 1800; the wireless telegraph, by Preece and Marconi, in 1895 and 1896, are only a few among notable foreign inventions. Industry moved out of the home into the factory; retail production became wholesale; the world became one vast factory, machinized, power-driven.

THE INDUSTRIAL REVOLUTION

The factory age came in disastrously for the hand-workers. The problem that they faced was simple. Here was a machine which required two men, where 200 had been needed for the hand-making of the same product: what was to become of the other 198? There were several possible solutions. The work might have been distributed among the 200, meaning infinitely shorter hours, with the same pay for each. Or the living conditions of the few retained at this work might have been improved, and the balance put to other useful work, with improved living conditions. Or any intermediate stage, down to the dreadful chasm of excessive hours and pitifully inadequate pay for the few workers retained to tend the machines, with gruelling, underpaid tasks and wholesale unemployment for the balance. The last was the method which came in; for, in its beginning, the Factory Age was dominated by utter greed and callousness with regard to social living conditions.

Hundreds of hand workers were thrown out of work; and in their blind hatred of the machines that were robbing them of their daily bread, there were riots directed against the machines themselves, those invaluable servitors of man's progress. Moreover, the rapacious factory employers were quick to take advantage of the general unemployment, by letting the needy bid against each other for the few available positions. Men, women, and children were worked unbelievable hours, eighteen and twenty hours a day, wrecking the health and the morality of the workers. The celebrated Chapter XIV of Marx's *Das Kapital* pictures the black dawn of the factory system in England with unforgettable accuracy.

Formerly the hand workers lived each in his little cottage, raising enough garden produce to satisfy the family's needs; now hundreds of workingmen had to live in hideous rows of shacks built near the factory, and from these the ugly tenement slums of our cities grew into being. There had always been a social cleavage between the rich and the poor; but the new chasm between the capitalist, or man with money invested in human labor power, and the laborer, usually the proletarian, or workman owning nothing but his simple bodily coverings and his labor power, grew deep, horrid, and apparently unbridgable.

Other evil effects of the installation of the factory system included its effects on women and children. Formerly, children could only be employed in odd jobs; now, since much of the employee's task consisted in watching a machine, children could be employed in many new capacities, and women as well. The old form of employment for women consisted of varied work at home, in comparative leisure; the new wage servitude included work amid the uncongenial factory surroundings, without variety of occupation, and under the speeding-up efficiency processes of taskmaster foremen and forewomen. Factory legislation has slightly bettered this condition; but it is still harmful to women, children, and the race. It is most harmful in those factories where the highest efficiency prevails, in which each workman repeats infinitely some small mechanical detail of a vast system of production. Here all of the craftsman's creative pleasure in making something is gone; and, instead, we have a workman's mind obsessed, during all his important working hours, by some such brutalizing and dehumanizing activity as punching a single hole in a bar of iron, endlessly, endlessly repeated.

The collective protests of the workingmen have taken many forms, especially labor unionism and socialism. The former consists essentially in an acceptance of the capitalist system of production, with the efforts of the workingmen directed toward shortening the hours of work, increasing the remuneration, bettering the living and working conditions, and restricting employment to members of the union. Labor unions, at first outlawed by the courts, have now succeeded in generally forcing a recognition of their chief claims, the right to organize, to strike, to picket, to boycott, and to dictate increasingly the conditions of production. In proportion as they are aggressive, and not merely defensive, before the courts, their legally recognized powers and rights grow.

Socialism at first was visionary or Utopian. For instance, Robert Owen, a benevolent early English socialist, relied on the kind hearts of the capitalists to bring about the desired betterment of the lot of the working classes. Karl Marx (1818–1883), the brilliant German originator of "scientific socialism," forced into exile from his native land to spend most of his life in more liberal London, held that, just as the middle class or capitalists had replaced the feudal overlords, just as inevitably the proletariat, or propertiless workingmen, must replace the capitalists. He and Frederick Engels in 1848 uttered their famous *Communist Manifesto*, a socialist appeal to labor to rise and seize the means of production themselves, since they had nothing to lose but their oppressions and their oppressors. Marx's expanded study of the class struggle, or agelong conflict between the two classes, called *Das Kapital,* has profoundly affected subsequent European history, and has been called the workingmen's Bible.

Socialism is merely the group expression of the belief that the means of production and distribution should be commonly owned by all, and democratically managed. Its two chief divisions are collectivism, which holds that each man should receive, as well as can be ascertained, the social value of his labor; and communism, which holds that the motto, "From each according to his abilities, to each according to his needs," should rule. Neither, of course, stands for a division of property; both stand for collective or joint ownership of all the means of production and distribution, and an end of the employment of man by man. In some modified form the theory is slowly being incorporated into civilization's achievements.

THE REVOLUTIONS OF 1848 AND 1870

We have spoken of the overthrow of Louis Philippe in 1848, and the popular unrest that elevated the nephew of Napoleon to the presidency. The spirit of revolution, the uprising of the lower classes, took the quickened opportunity to awake throughout many parts of Europe. Austria at this time held, as ruler of Lombardy and Venice, the control of Italy; her other Hapsburg possessions were inhabited by Germans, Slavs, and Hungarians or Magyars. The Bohemian Slavs, the Hungarians, and the Italians longed for freedom. On March 13, 1848, the populace of Vienna rose, and caused autocratic Metternich to flee. The alarmed emperor, before the month was out, gave to the kingdoms of Bohemia and Hungary the rights they sought—equality of all classes in taxation, religious freedom, liberty of the press, and other rights; and gave to each country, and to the Austrians, a parliament, which was to meet annually.

This contented the reformers, who did not seek to break the chains binding them to Austria.

Italy felt differently. When Metternich fell, the people of Milan drove out the Austrian troops; much of Lombardy followed suit. Venice, inspired by this, drove out the Austrians, and set up a republic again. Most of Italy was in revolt; the first Italian war for independence had begun.

Germany caught the contagion; reform movements awoke in Saxony, Bavaria, Württemberg, and Baden. The king of Prussia, Frederick William IV, saw his chance, and took the lead, promising assemblies to make constitutions for Prussia and for all of Germany. The conservatives slowly recovered from the sudden onset; and the extreme radicals began to assail the torpor and inactivity of the liberal reform governments. In Italy, the Austrians maintained some power; but one by one the states declared themselves free, and under Mazzini met, abolished the temporal power of the pope, and proclaimed the Roman republic.

Prospects for national freedoms in the Austrian domains were ended by rivalries between the different racial groups—rivalries skilfully augmented by the Austrian statesmen. The weak emperor was forced to abdicate in favor of his young nephew, Francis Joseph I, whose long reign was in the main autocratic. Hungary had declared itself a republic under the patriot Kossuth; Russia aided Austria in crushing the uprising in blood. By 1866 Hungary won its independence by peaceful means, and became the eastern half of the Austro-Hungarian empire. Charles Albert, king of Sardinia, renewed his assaults on Austria in Italy, and was finally defeated at Novara. On his abdication, his son, Victor Emmanuel, succeeded to his power; and this man was destined before many years to become king of Italy. In Germany a constitution was patched together, intended to cover both Prussia and the German parts of Austria; and the imperial throne was offered to the Prussian king. Timidity led him to refuse the promotion, and the year's work came to nothing.

The revolutions of 1848, promising so much, largely withered; but a few encouraging results remained. Moreover, these revolutions differed from those of 1789 in view of the new economic alignments and demands—the demands of the workingmen for an economic reorganization of society. Even although this demand failed for a time, it was only a temporary setback. It is still the dominant problem of civilized society.

The Italian state of Piedmont, under Victor Emmanuel and his able minister Cavour, rapidly developed into an Occidental state. It found in Napoleon III of France, an unexpected ally; for this man, in reality a usurper, knew that only military glory could rivet his hold on France; and he adjudged that a war against Austria for Italy's liberation would furnish the needed glitter to his seedy imperial coat. By April, 1859, the war broke out, and at Magenta and Solferino the allies decisively defeated the Austrians. The treacherous French emperor, tiring of the war and doubting its ultimate glory, arranged a peace with Austria which left Italy largely bound. But the forces he had unleashed could not be checked by his belated royal treason. Tuscany, Modena, and Parma voted to unite with Piedmont. Garibaldi and his republican red-shirts took over Sicily in the name of Victor Emmanuel, "King of Italy." All southern Italy was soon taken over; and the conflict ended with all Italy, except Rome and one other state, under the banner of united Italy. A new aid was found to win these last provinces.

In 1858 William I took over the rulership of Prussia—a practical and aggressive man, whose ambition was to reject Austria from the German confederation, and build a Germany which would rank with the greatest states in Europe. His able minister Bismarck laid the plans, which included the development of a formidable army. He picked a quarrel with Austria over the disposition of Schleswig-Holstein, a German province rescued from Denmark; and allied himself with Italy for a joint attack on the Austrian power. At Königgratz, or Sadowa, Austria was utterly defeated, and the three weeks' war ended with Prussia entirely in the saddle.

Prussia's first step was to organize the North German Confederation, meanwhile strengthening her own might. The resultant union was a federation of united monarchies, with the real sovereignty in the United governments. Napoleon III, jealous of this quick Prussian victory, encouraged the opening of a quarrel with Prussia over some insignificant point of difference connected with the succession to the Spanish throne; and in 1870 the war broke out. All Germany forsook its jealousy of Prussia, and united under the standard of united Germany. The Germans crossed the Rhine, and sent the French flying. Two French armies were captured, and the French emperor himself was taken prisoner in the battle of Sedan. The war was only seven weeks old—and German troops were already laying siege to Paris.

Napoleon III, completely discredited, gave way with his empire to the third French republic; in spite of its resistance, Paris was surrendered on January 28, 1871. Bismarck humbled France by annexing two French provinces, Alsace and northeastern Lorraine, to which indeed Germany had a partial title; and by demanding an indemnity, enormous for that time, of 5,000,000,000 francs, with German troops quartered in France until the last sou had been paid. France hastened the payment; but the bitterness engendered was a strong force toward the causing of the World War of 1914.

The war of 1870 consolidated Germany; South Germany willingly allied itself to Prussia and the north; and on January, 1871, in the palace at Versailles, William, King of Prussia and President of the North German Federation, was proclaimed Emperor of Germany. Guided by Bismarck, its man of "blood and iron," Germany soon took its place among the leading European powers.

Just after the surrender of Paris, the city's populace had risen, reestablishing the commune of the earlier Reign of Terror; and proposing to burn the city, rather than let it fall into the hands of the French national government. After two months of fighting, the insurgents fell, burning in their struggles the city hall and the Tuileries. Under a new National Assembly elected in 1871, peace was made with Germany; and in 1875 the republic was finally established, in spite of strong monarchical sentiments. France has since been governed by this power.

The pope's hold on Rome had been supported by Napoleon III; when the French usurper fell, the Italian army entered the Eternal City, which had been held by the head of the Catholic Church for more than a thousand years. The people of Rome voted overwhelmingly to join the kingdom of Italy; and Victor Emmanuel and Cavour transferred the capital to the mother city of later Occidental civilization. The pope was given the sop of being still regarded as a sovereign prince, with his palaces the whole of his cabinn'd, cribb'd, confin'd realm. The popes do not accept this arrangement, and still regard themselves as prisoners of the Italian government. Italy took a strip of Abyssinia, along the Red Sea; and, after the war against Turkey in 1912, Tripoli. In spite of general poverty and migration to the United States, Italy is today at least a second-rate European power.

Germany, with a powerful Social Democratic Labor Party, based on the theories of Karl Marx, went a long way toward abolishing poverty; Bismarck himself, to stop socialist agitation, introducing many socialistic measures. In 1888 William II, the Kaiser of the World War period, took over the power, and by his arrogance lost the services of Bismarck. Germany under the second William planted colonies in Togo, Cameroons, German Southwest Africa, German East Africa, in Africa, and Kiaochow in China, and also developed manufacturing and a magnificent merchant marine. So she grew toward the debacle of 1918.

ENGLAND BECOMES THE BRITISH EMPIRE

England, during the 18th century, took from its monarchs the right of making laws, and lodged this exclusively in Parliament. The Habeas Corpus Act of 1679 prevented arbitrary arrests by the king, and furnished an independent judicial system. The lower classes demanded the right to vote, or right of suffrage; and the Reform Bill of 1832 extended the vote to the lower middle classes, requiring a property qualification for the ballot. The disappointed poor united in the six demands of the Great Charter:

1. Universal suffrage.
2. A secret ballot.
3. Parliament elected annually.
4. Payment for members of Parliament.
5. Abolition of the property qualification for members of Parliament.
6. Equal electoral districts.

The supporters of this, called the Chartists, obtained over 1,000,000 signatures to their monster petition for these reforms, and held enthusiastic meetings and parades all over England. The petition was presented to Parliament in 1839, and was rejected by a large vote. The French Revolution of 1848 gave the Chartists their last chance to form a demonstration; 6,000,000 names were secured to a petition, and the ranks marched on London. The aged Duke of Wellington headed the force policing London, and the movement collapsed.

Yet the agitation continued; and in 1867 Parliament passed a Reform Bill doubling the number of votes. In 1884 the Liberal Party, under Gladstone, added 2,000,000 more voters. By 1906 the Liberal Party had to face the demands both for universal manhood suffrage, and for woman suffrage as well. Militant suffragettes, using strange eccentricities of violence, like pouring acid in the letter boxes, enlivened the struggle; and the comradeship induced among men and women by the trials of the World War at last forced Parliament, in 1918, to extend the vote to all women over thirty; and, in the next year, to make women eligible for all offices. Complete equal suffrage may be adopted at any time. Before 1914, New Zealand, Finland, Australia, Norway, and Sweden were the only countries granting the franchise to women; by 1920, the United States, Great Britain, Canada, Denmark, Holland, Russia, Rumania, Serbia, Luxemburg, Germany, Austria, Hungary, Poland, Esthonia, Lithuania, Latvia, Czechoslovakia, the Ukraine, Palestine, and other dependencies and powers, had granted this right to women.

England is governed by cabinets representing the political party that secures a majority of the popular votes. A new election must be held at least every five years for members of Parliament, according to the 1911 law; but, whenever the government, as represented by the cabinet, is defeated on any important measure in Parliament, it may resign, and a general election is held at once. Thus the British government, and other European governments following its example, are more sensitive to popular opinion than that of the United States and the other countries with a more rigid election of law-makers.

During this period, England also acquired religious freedom, free popular education, a lightened criminal law, labor legislation reducing the hours of employment and safeguarding the working of women and children, and other needed reforms. Most countries have acted under high protective tariffs; England, needing to be supported by the rest of the world, has stood for free trade, or the admission of goods from other countries without tariff duty. Of course, a tariff is no more needed between countries than it is between the various states of the United States; and ultimately free trade will probably be the world custom.

The turncoat reformer, David Lloyd George, a veritable "Vicar of Bray," like the parson who changed his religion to suit every change in the faith of his sovereigns, became dominant in England. In his celebrated budget of 1909, Lloyd George placed the burden of taxation on the rich, by a graduated income tax—a socialistic measure. An outgrowth of the fight over this budget, which carried, was that the House of Commons deprived the House of Lords of the power to veto bills expressing the will of the people, upon the vital questions of finance and taxation.

The question of Irish Home Rule annoyed England during the whole last century, gradually growing in bitterness. The Irish, since 1910, have been divided into two chief groups, those who would accept Home Rule under British overlordship, especially the Irish in protestant Ulster; and the party called Sinn Fein, or "we ourselves," whose backward vision intended an isolated Ireland, returning to the forgotten Gaelic language and culture, in an independent Irish Republic. Ten years of fighting was followed by the setting up, in 1919, of the Irish Republic, under the presidency of a college professor, Eamonn de Valera, with an Irish legislative body, the Dail Eireann. A treaty arranged in 1921 admitted Ireland, as the Irish Free State, into the British Empire on the same terms as Canada, Australia, and similar semi-independent dependencies. Ulster, unwilling to join with the Roman Catholic south, has its own "Government of North Ireland;" so the land has home rule, without either complete union or complete independence.

The British empire covers one fourth of the inhabited portions of the earth; one fourth of the world's people owe allegiance to the English ruler. Among these are self-governing dominions like Canada, Newfoundland, New Zealand, Australia, South Africa, and the Irish Free State; tightly bound India; and numerous smaller Crown Colonies and other Colonies more or less dependent.

THE THIRTEEN AMERICAN COLONIES

When the Europeans began their conquest of the Americas, the Indians, except for those in Mexico and Peru, were mainly in the Neolithic or polished stone age. Their backwardness of culture was due to the fact that this branch of the Mongols had been isolated on the split double continent, almost as completely as the Australians had been isolated; there was no point of geographical contact with other cultures, like the common meeting ground of Asia, Europe, and Africa along the coasts of Syria and Asia Minor.

In 1606 James I, Elizabeth's successor, chartered two companies of "certain loving subjects," the London and Plymouth companies, to settle America. The former had a strip of land, reaching 100 miles inland, from 34° to 38° north latitude; the latter, the strip from 41° to 45°. The land between was a neutral strip, to belong to whichever settled it first, with the proviso that neither could settle within 100 miles of the other. In May, 1607, about 100 colonists, sent out by the London Company, settled at Jamestown on the James River, in Virginia. The colony would have been abandoned, but for the vigorous efforts of Captain John Smith. By

1610, deprived of this leader by a gunshot wound and his return to England, the remnant of sixty starved settlers, out of the maximum of 500 who had reached Virginia, took ship to return to England. The arrival at this moment of the new governor, Lord de la Warre (or Delaware), with men and supplies, turned the flight into a victorious return.

The men had come after gold; they found their livelihood instead in the simpler pursuit of agriculture, particularly tobacco raising. In 1619 a boatload of "respectable maidens" came over, who were auctioned off to the settlers, as wives, for so many pounds of tobacco apiece. The same year saw the arrival of the first cargo of Negro slaves; and the first representative government convened on American soil. Spain, France, and Holland had colonies already in America; but England gave the continent democracy.

Virginia, at first a colony governed by proprietors, in 1624 was annexed by James I as a royal colony. It earned the title "The Old Dominion" by loyalty to the Stuarts. When Charles I was beheaded, many of his supporters, the cavaliers, came to the colony; and on the accession of Charles II in 1660, the Virginia burgesses recognized his authority so promptly, that he elevated the colony to the proud position of a dominion. The only serious revolt here occurred in 1675, when the Susquehannock Indians were ravaging the colony; and the royal governor, Berkeley, profiting excessively by the fur trade, refused to punish the Indians. A popular young planter, Nathaniel Bacon, took arms and routed the Indians. In the civil conflict that followed, the governor was driven out of Jamestown, and the capital burned. But Bacon died, of fever or poison, at the moment of victory; and his rival, Berkeley, took grim bloody toll of the rebels. The English king commented drily that his assiduous Virginia governor had killed more men for the minor revolt than he had killed for the beheading of his royal father. But the revolt showed that the men of the Old Dominion, loyal as they were, would not submit to despotism.

In 1620 a group of English Separatists, who had left the Church of England because it retained Catholic practices, landed at Plymouth, in Massachusetts. They had sailed from Holland, where they had been driven by James I, and where they were unwilling to sink their English culture and customs in a foreign land. They came to find a place where they could worship God in their own way, and where they could force others to worship God in the same way, or move on. The London Company had granted them permission to settle in Virginia; but the unskilled pilot brought them instead to New England, where they stayed. Before landing, in the *Mayflower* cabin the prospective settlers pledged themselves to form a government and obey it—the first instance of complete self-government in our history. At first the living was hard; but they prospered slowly and soberly, and aided always in the defense of New England. The terrible Indian war of 1675, King Philip's War, set them back; and in 1691 they were annexed to the powerful neighboring Puritan colony of Massachusetts Bay.

This colony was chartered in 1628 by Puritan gentlemen, members of a religious group who desired, not to separate from the Church of England, but to stay within it and purify its worship. In 1630, almost 1,000 colonists came over. John Winthrop, the courtly governor, and John Cotton, the rigid preacher, were the leading spirits at first; and, like Plymouth, like the split England they had left, they detested religious freedom, and desired a place where they could worship in their own way, and make others do the same, or get out. Roger Williams, pastor of the Church of Salem, taught, unacceptably to the Puritans, that the land the settlers occupied really belonged to the Indians, in spite of the royal charter; and that the state could not control a man's conscience. Accordingly, in 1636, Williams was driven out of the colony. He made his way southward through winter-bound forests, and at the head of Narragansett Bay, purchasing a tract of land from the Indians, he started the settlement called Providence in acknowledgement of God's guidance. In 1643 Williams and other dissenters, occupying four small settlements, secured a charter for their tiny colony of "Rhode Island and Providence Plantations"—a colony distinguished for democracy, and religious freedom. For his high conception of freedom, far in advance of his age, Roger Williams stands out as an impressive portent in colonial history.

The Puritan pastor, Thomas Hooker, left Massachusetts Bay voluntarily in 1636, irked by the rigid religion, and settled Hartford and other Connecticut towns. In 1639 he and his followers adopted their "Fundamental Orders," the first constitution drawn up in America, the first in modern history composd by the free founders of a government. New Haven was settled in 1638 by Puritans stricter than those in the Massachusetts Bay group; and these, to their disgust, found themselves included, in the royal charter of 1662 to Connecticut, with their more liberal Puritanic brethren in Hartford and elsewhere. For years Massachusetts Bay domineered over the rest of New England. Made a royal colony in 1684, under harsh Sir Edmund Andros as governor, the Massachusetts settlers, on learning of England's 1688 revolution against the Stuarts, jailed the governor, and welcomed William of Orange, the new overseas sovereign.

Maryland was settled, by royal permission, in 1634, by Cecilius Calvert, Lord Baltimore, a Roman Catholic who desired an asylum for his persecuted fellow-religionists. He made the colony open to all Christians; and soon the protestants outnumbered the Roman Catholics three to one. In self-protection the Maryland assembly passed the famous Toleration Act, guaranteeing freedom from molestation to all "professing to believe in Jesus Christ." This did not go as far as Rhode Island, which allowed Jews and freethinkers, as well as worshippers of Christ. The Carolinas were settled under the ownership of gentlemen equipped with an elaborate unworkable constitution, drawn up by the philosopher John Locke; the actual settlers were largely fugitives from justice, and the place became a rendezvous for the pirates who preyed on all flags alike.

In 1609, Henry Hudson, an English navigator employed by the Dutch East India Company, sailed up the Majestic River which bears his name; in 1614, the first Dutch fort was established on Manhattan Island. Between 1638 and 1647 five or six Swedish trading forts were set up along the banks of the Delaware River; these were captured by the Dutch from New Amsterdam, later called New York, in 1655. In 1664, the English conquered the whole tract from the Dutch. Manhattan Island and much of lower New York City are still pockmarked with old Dutch names; and another relic of Holland's stay was the spirit of absolute and undemocratic government that ruled New York long after the peppery Dutch governor, Peter Stuyvesant, had lowered his flag.

New Jersey, also taken from the Dutch, was made a separate colony, with a more liberal charter; and after a stormy career it joined the other colonies in their 1776 revolt from the stepmother land. Pennsylvania was founded in 1682 by William Penn, a courtly convert to Quakerism, that simple Christian faith founded by Charles Fox. For a time Penn held Delaware as well; in 1702, this became a separate colony. Complete religious freedom, and fair dealings with the Indians, marked Penn's domains, and caused an early and enduring prosperity. Improved prison conditions, and the first protest against slavery, embodied in the Germantown protest of 1688, are other distinctions of this liberal settlement.

Last of the thirteen original colonies was Georgia, settled in 1733 by the philanthropist James Oglethorpe, as a place where English debtors and criminals might work out their salvation in the new world.

THE REVOLT AGAINST HANOVER ABSOLUTISM

The Mercantile Theory of Commerce, which dominated England's treatment of her colonies, has already been mentioned—that theory which held that a land's prosperity was measured by the amount of gold it had. By this, every nation tried to buy as little from its neighbors as possible; and to sell to them as much as it could. Europe looked upon its colonies as places where it could sell its goods; the colony must furnish the raw materials—iron, wool, furs, hides—and buy back the manufactured products—steel, clothing, hats, shoes, from the motherland, paying the difference in gold. Where was the gold to come from? This did not concern the short-sighted economists. Instead, Cromwell, before 1660, and the ministers of Charles II, between 1660 and 1663, settled the burdensome Navigation Acts on the colonies, providing:

1. No goods could be carried out of the colonies, except in ships built in English dominions, and
2. Manned by crews, three-fourths of whom must be English.
3. Enumerated commodities, tobacco, cotton-wool, sugar, with, later, furs, rice, copper, and naval stores, could be exported only to England.
4. No European goods except salt and wine could be imported, without stopping in England to pay duty or be inspected.

This treatment, forbidding trade with the French and Spanish Indies in lumber, fish, and grain, made it impossible for the colonies to get the gold England demanded of them. Accordingly, smuggling began to prosper, and great American fortunes were rooted in it. England, due to William's war against Louis XIV of France, followed by the English minister Walpole's twenty years of tolerance, and the renewed war with France, postponed the enforcement of these harsh trade laws; and the colonists prospered.

New England developed a bleak Puritanic character. Before 1650, education had been made compulsory everywhere except in Rhode Island. Harvard College was established in 1636, six years after Winthrop landed. The clergy were the leaders of the thought and activities of the colonists, preaching interminable sermons in the arctic cold, and teaching narrowness, self-righteousness, and the sinfulness of normal human enjoyments. The lush soil of the South, with its leisurely slave-nourished culture, and its part cavalier background, became something like the squireocracy that marked Old England. The colonies between these sections were halfway between the two ideals, the witch-burning Puritan and the toddy-drinking Southern gentleman. In 1640 the Bay Psalm Book was published in Boston, the first book published in the New World north of Spanish Mexico. In 1690, the first newspaper in the colonies appeared in Boston. By 1750, all the colonies had papers. Yet the colonies were so isolated, by lack of easy travelling conveniences, that the problem of uniting them was not easy.

France under Samuel de Champlain had founded an empire in Canada; under Robert Cavalier, Sieur de la Salle, she had taken over the whole flow of the Mississippi, from the Great Lakes to the Gulf. The English Stuarts remained friendly to France; at their fall in 1688, a century of warfare between England and France developed, in the New World as well as the old; and at its end England had taken over all of New France. The English general Braddock, in spite of the advice of the young Virginia planter George Washington, in 1755 suffered an ignominious defeat at the hands of the French and Indians. The brilliant management of England's war minister, William Pitt, brought about the ultimate success of English arms. The war ended about the time that the English general Wolfe stormed Quebec, held by the French Montcalm, both commanders dying in the assault.

With the removal of the danger of French attack to support England's power against the colonists, the Americans began to look askance at continuing English tyranny. This was embodied in the burdensome Navigation Acts, in royal seizure of colonies, in arbitrary and incompetent governors, in crown vetoes of acts of colonial parliaments. In 1765 the Stamp Act was passed, requiring that no paper be used in the colonies for any purpose, except paper stamped by the British Government. A vitriolic young Virginia lawyer, Patrick Henry, denounced this violently in his assembly; as far off as Massachusetts, the resistance spread. In 1765 a Stamp Act Congress, with twenty-seven members from nine colonies, met in New York, and published its "rights and grievances," denying the legality of the taxes not levied by their own assemblies. In 1766 England repealed the troublesome act; and the same year additional taxes were laid on tea and other substances. The colonies protested at once; and in 1770 British soldiers opened fire on Boston colonists, killing five and wounding more. This "Boston Massacre" awoke the anger of many Bostonians, including Samuel Adams, of a thriving family interested in smuggling; and his insistence won the removal of the British soldiers from the town.

In 1770 all duties except a trifling tax on tea were removed. This was retained in an endeavor to establish England's legal right to tax the colonists; and the purchase of taxed tea was made attractive, by removing the English duty on this tea, so that the tea, after paying the colonial tax, was much cheaper to the colonists than tea smuggled from Holland. The trick did not work, for its working would have ruined the thriving smuggling business; and in 1773 Bostonians disguised as Indians, in the Boston Tea Party, threw overboard a cargo of English tea in Boston harbor. England passed the "Intolerable Acts" to punish Massachusetts; in retaliation, on September 5, 1774, representatives of all the colonies except Georgia met in Carpenter's Hall, Philadelphia, to frame their protest, and to meet during May following for further steps. Before they could meet, armed rebellion broke out in Massachusetts. In England, Burke, Pitt, Fox, and other high-hearted opponents of the Hanoverian, George III, sided with the colonists; many of the latter were Tories, siding with the English crown. Thus the family squabble commenced, with both houses divided.

January 10, 1776, Thomas Paine's spirited *Common Sense*, urging independence with unanswerable logic, was published in Philadelphia. On June 7th, at the Continental Congress, Richard Henry Lee of Virginia, moved independence from England; on July 2nd, the motion was passed by all the colonies except New York. On July 4th, according to popular belief, the Declaration of Independence, framed by Thomas Jefferson, Benjamin Franklin, John Adams, and two others, was passed. Washington, in command of the colonial armies, was driven back from New York and New Jersey, but recovered with a telling blow at Trenton. At Saratoga, in 1776, the British general Burgoyne was forced to surrender; and this persuaded hesitating France that she could safely throw in her aid with the struggling colonists. Vigorous fighting occurred in the South and in the West, in the latter place under the young fiery colonists of Kentucky and

Tennessee. In the North, the disgruntled Benedict Arnold attempted to sell West Point to the British, a treasonable plan prevented by the accidental capture of Arnold's messenger. Lord Cornwallis, the English commander, retreated down the peninsula of Yorktown, to be carried by a British squadron to New York. Instead, the English fleet was driven off by a French squadron under de Grasse; and Washington, the Frenchman Lafayette, and other colonial leaders hemmed in the Englishman and forced his surrender. This was the virtual end of the war. A complicated peace treaty was executed at Paris in 1783.

Between 1776 and 1789, the former colonies in America were governed by a Congress, a group of two to seven delegates from each state. Franklin, in 1775, had submitted a draft for colonial union. The Articles of Confederation, based on this, were approved by Congress in 1777; but the last of the states, Maryland, did not assent to these until 1781. The delay was caused by the insistence of the smaller states that Massachusetts, Connecticut, New York, Virginia, the Carolinas, and Georgia should cede to the United States their claimed Western territories; and New York and Virginia led the way in this act, which gave the national government a vast domain to sell and enable it to settle its war debts, and out of which new states could be formed.

The Articles of Confederation were far too loose to provide a strong central government; and in 1787 representatives of all the colonies met in Independence Hall, Philadelphia, to form a more effective government. Virginia, representing the larger states, proposed a truly national organization, with a House of Representatives representing the whole people and elected by them, and a Senate elected by the House. New Jersey, representing the small states, proposed that each state have an equal number of representatives in the Congress. The compromise followed the New Jersey plan in the Senate, and the Virginia plan in the House. All other disputed matters were similarly compromised; and the Constitution was adopted and sent to the states for ratification, in time to have Delaware approve it before the end of

1787. Nine states had ratified before a half year was out; Virginia and New York, after bitter struggles, followed soon; North Carolina accepted it in November, 1789; and Rhode Island was brought to terms, by a threat to treat her as a foreign nation, in 1790.

The Constitution, instead of consisting of a mere Congress, as had the Articles of Confederation, divided the government into three branches:

> The legislative (Congress).
> The executive (president, cabinet, army, and navy).
> The judicial (the Supreme Court of the United States and lesser federal courts).

The cabinet is not provided for in the Constitution; and has grown from the original four departments, State (foreign affairs), Treasury, War, and Post Office, to the ten departments of today. It was the plan of the framers of the Constitution that the president should be selected by calm deliberation of an intermediate body called the electoral college, somewhat like the election of a pope by the college of cardinals. The growth of party feeling soon made this the archaic and ineffectual machinery it still is.

Certain states, notably Massachusetts, accepted the Constitution with recommendation that amendments be added safeguarding the immemorial rights of liberty of speech and press, freedom from arbitrary arrest and cruel punishment, freedom of peaceable assembly and petition against grievances, and a jury trial. Ten amendments, called collectively the Bill of Rights, embodying these, were adopted and ratified by November, 1791. Since then, nine amendments have been added: two slightly revising original clauses; three caused by the ending of slavery by the Civil War; and the last four, from 1913 to 1920, granting an income tax based upon incomes throughout the nation, followed by popular election of senators, nation-wide prohibition of intoxicating liquors as beverages, and suffrage irrespective of sex.

EFFECT OF THE FRENCH REVOLUTION

Washington was elected as the first president, and served for two terms of four years each (1789-1797). His strong cabinet held two bitter opponents—Alexander Hamilton, the brilliant secretary of the treasury, a believer in aristocratic government; and Thomas Jefferson, secretary of state, an intellectual and emotional sympathizer with the French Revolution. Jefferson hated centralized government so strongly that he insisted that a revolution every twenty years was good for every nation. Hamilton placed the finances of the government on a firm footing, by agreeing to pay the national debt, by assuming the debts incurred by the states during the Revolutionary War, by chartering a national bank, and by instituting a tariff for protection, as well as revenue. This policy split the cabinet and country into two parties—the conservative Federalists (Hamilton, Washington, the vice-president John Adams and others) and the anti-Federalists, led by Jefferson. The former stood for a strong central government; its successors, the National Republicans, Whigs, and the present Republicans, have continued this policy. The Anti-Federalists, and their successors the Democratic Republicans and the present Democrats, stood for states' rights. This is the dividing theory: in practice, the party in office has always sought to increase its control, by seizing power for the national government.

The French Revolution came during the conservative rule of Washington; and, in spite of France's aid to the colonies, Washington insisted upon and enforced neutrality between France and allied Europe, with which it was at war. Internal struggles at this time included the Whiskey Rebellion in certain Pennsylvania counties, put down by the president by the aid of the militia of four states.

In 1796, the Federalist vice-president, John Adams, was elected president over Jefferson by only three votes in the electoral college (71 to 68); and during his single term a bitter disagreement with France took place, called the "X. Y. Z." affair, from the three letters designating the three anonymous French citizens who tried to force a bribe from the American commissioners. A state of war with France resulted from this, including Congress's authorization to our ships to prey upon French commerce.

The Federalist party fell, chiefly through their efforts to silence criticism by the harsh Alien and Sedition Acts. These acts were opposed by such far-sighted Federalists as John Marshall, later the strongest Chief Justice of the Supreme Court, and Alexander Hamilton. The opposition to these acts, directed by Jefferson and James Madison, succeeded in passing the Virginia and Kentucky Resolutions, in these two states, calling the acts of Congress "altogether void and of no effect"—the first assertion of the states, through their legislatures, that they had power to judge whether acts of Congress were constitutional or not. Under Marshall, this power was taken over by the Supreme Court, where it has since resided.

THE DEMOCRATIC REVOLUTION

In 1800, in spite of petty Federal trickery, Jefferson was elected president, and held office for two terms. The revolutionary fire-eater tamed down in the presidential seat of the mighty. The capital was moved to Washington, in the District of Columbia on the Potomac, granted jointly by Maryland and Virginia to the nation. Jefferson's two cardinal planks were strict economy, and a strict observance of the letter of the Constitution. Almost his first official act was to negotiate for the purchase of all Louisiana from France for $15,000,000, a transaction not empowered by the Constitution, although of inestimable value to the young country. Thus the bald requirements of facts can overturn the most vehement theories. Immediately Jefferson commissioned Captain Meriwether Lewis, his private secretary, to explore the new territory; and Lewis, with William Clark, journeyed clear to the Oregon country on the Pacific.

Jefferson's second term was embittered by the ambitious plan of Aaron Burr, who had lost public favor through his killing of Alexander Hamilton in a duel, while Burr was still vice-president. This plan, it was charged, involved either Burr's carving himself an empire in the Mississippi Valley, or grasping Spanish territory to add to that of the United States. Burr was arrested and tried for treason; the jury, under Marshall's charge, found no act of treason, in spite of Jefferson's desire for a conviction.

Meanwhile, Napoleonic warfare in Europe slowly embroiled the United States. Under Madison, the fourth president (1808-1816), this developed into the war of 1812 against England, a mere incident in England's warfare against France. The British raided and burned Washington, and were fairly successful throughout; the ending of the European troubles by the defeat of Napoleon ended this war as well. The treaty of Ghent (1814) restored conditions to what they had been before the war. New England, its commerce suffering by hostilities with Europe, opposed the war bitterly throughout its course.

During this era, the East was migrating to the West. The chief sufferers were the East, which was slowly drained of its best blood; and the Indians, who slowly retreated, leaving their dead behind them, toward the harsh sunset. Six new Western states, Louisiana, Indiana, Mississippi, Illinois, Alabama, and Missouri, were admitted to the union between 1812 and 1822. After Madison came James Monroe and the "Era of Good Feeling" (1816-1824), when the strife of parties was swallowed up in the decline and disappearance of the Federalists. The Anti-Federalists, calling themselves Democratic Republicans, in 1811 had refused to recharter Hamilton's national bank; but in 1816 they themselves chartered a second national bank, due to the failure of state banks caused by the exigencies of the war of 1812. Again, the bald requirement of facts overturns the strongest theories. During this period, quietly and almost subterraneously, the United States Supreme Court, under John Marshall, began its steady policy of encroachment beyond the limits of the Constitution, further welding the "United States" into one central government.

In 1810, under a doubtful legal claim, American troops took possession of West Florida from Spain; the next year, the troops took East Florida also—a bit of brigandage against which England protested so strongly, that Madison withdrew his troops in 1813. Spanish depredations continued, and in 1817 Andrew Jackson, the hero of the Battle of New Orleans, thoroughly conquered all of Florida. That battle, incidentally, clearly illustrates the isolation of the world of 1814: since it occurred some time after the treaty of Ghent had been signed, but before word of the signing had reached New York. In 1819 Spain ceded Florida to the United States, on our assumption of $5,000,000 damages due by Spain to American citizens.

The "Holy Alliance" of Russia, Prussia, Austria, and France, in 1821 banding themselves to restore powers and possessions upset during the Napoleonic wars (which would have included Spanish territories in the Americas that had freed themselves during the period), was merely the final straw in Monroe's decision to prohibit further European meddling in America. Accordingly, in his annual message to Congress of December 2, 1823, Monroe incorporated the famous Monroe doctrine, stating:

1. The Americas were henceforth not to be considered as subjects for future colonization by any European powers.
2. The United States would not meddle with the European systems of government, nor
3. Disturb the existing European possessions in the Americas.
4. The United States would resist any attempt to extend the workings of the Holy Alliance to any portion of the Americas.

This arbitrary assertion of power, necessary to prevent America from becoming the battleground of European graspers, has been used to justify repeated seizures by the United States of territories in the Americas, extending down to today, in order to prevent their seizure by European nations, or for some less altruistic motive. The entry of the United States into the World War, in 1917, ended our promise in Section 2 above; and it is a question merely of our power, as to whether we can still maintain the other three provisions of the historic doctrine.

In 1824, Andrew Jackson received the highest vote in the electoral college, but not a majority; and the House, in whose hands final choice lay in such a situation, voted in John Quincy Adams, son of the second president. The high protective tariffs of 1824 and 1828 contributed to the election of Andrew Jackson (1828-1836), whose warfare on the national bank defeated it, and aided in causing the panic of 1837. The first national convention of a labor party occurred in 1833 in Philadelphia; and, during this term, the "spoils system," by which the winning party ousted previous office-holders, irrespective of merit, and put in its own party workers to receive the spoils of office, became the political custom. The first national nominating conventions also date from this time. In opposition to Jackson the Whig party arose; but it was not strong enough, in 1836, to prevent the election of Jackson's hand-picked successor, Martin Van Buren. This colorless president lost out in 1840 to the Whig, William Henry Harrison, a frontiersman and Indian fighter.

THE SHADOW OF SLAVERY SPREADS

The problems arising out of Negro slavery soon eclipsed all other political questions. Both North and South had had slavery at first; but by the end of the 18th century every state north of Maryland, except New Jersey, had abolished the relic of barbarism. Between 1776 and 1790, all leaders of Southern thought favored abolition; and then the invention of the cotton gin, in 1793, saddled slavery crushingly upon the South. The proposed admission of Missouri as a state, in 1820, brought the first discussion to a focus; the celebrated Missouri Compromise let in Maine as a free state, Missouri as a slave state, and prohibited slavery in all the rest of the Louisiana Purchase north of 36° 30′.

Every great movement begins with a lunatic fringe, to use the penetrating phrase of the phrase-maker Theodore Roosevelt. The extremist abolitionists awoke with their protests against the national disgrace of Negro slavery. William

Lloyd Garrison and Wendell Phillips were outstanding leaders among these. Their cause was helped in the North and harmed in the South by the bloody insurrection led by Nat Turner, a Negro slave preacher, in which sixty whites were killed; and by the shortsighted "Gag Resolution" passed by Congress with a Southern majority, forbidding petitions against slavery, although the Bill of Rights specifically made such petitions legal. Ohio and Illinois were scenes of mob violence against abolitionists; and ultimately Boston itself witnessed this.

The storm center of the slave problem shifted to Texas and Mexico. Texas, largely settled by Americans, began to be mistreated by Spanish Catholic Mexico because of the alien American majority; and in a brief bloody war, partly inspired by the United States, the Texans established their independence. Harrison died soon after election, to be succeeded by Tyler, the vice-president, a Virginian Democrat put on the Whig ticket to toll away Southern votes. In 1844, James K. Polk of Tennessee was elected over Henry Clay, a brilliant Whig, Polk's platform being the re-occupation of Oregon and the re-annexation of Texas—his party claiming that Oregon was ours by discovery, and that Texas had really been purchased in 1803 from Spain. Clay stands beside the later James G. Blaine and William Jennings Bryan as one of the national popular idols who repeatedly just missed election to the highest office in the land; the custom tends more and more toward the success of harmless mediocrity, at the expense of the more brilliant national favorite.

Soon after Polk's election, Congress accepted Texas as a state. The Oregon matter was settled by a peaceful treaty with England, ignoring Polk's blustering slogan, "54° 40′ or Fight," in favor of the more moderate line of 49°. Mexico refused to accept our annexation of Texas. Zachary Taylor, the American commander, took up his position on the Rio Grande; and, when he refused to retreat to the Nueces, the Mexican leader crossed the Rio Grande, ambushed an American force, and killed sixteen of them. Polk accepted the challenge, and war was declared. California and New

Mexico were occupied, Taylor defeated the Mexicans at Buena Vista, and General Scott took the capital city of Mexico. The treaty of Guadalupe-Hidalgo, in 1848, closed the war, the United States paying $15,000,000, and assuming some debts of Mexico to our citizens, and receiving in return Texas, California, and New Mexico. Many historians regard the war as "the foulest blot on our national honor." It is at times difficult to select superlatives with accuracy, where the possible recipients of the reverse accolade multiply. In any case, the purchase of a small strip of land south of the Gila River, in southern Arizona, from Mexico in 1853, called the "Gadsden purchase," for $10,000,000, undoubtedly was a sort of "conscience money" paid by us to Mexico, in recognition of the fact that we had robbed her in the war and the treaty which closed it.

The discovery of gold in California, in 1848, peopled this part of the Mexican booty with men from the Northern states, who drew up a "free constitution" and came in as a state with a constitution prohibiting slavery. The great compromise of 1850, sponsored by Henry Clay, sought to pour the oil of compromise upon the troubled waters of slavery agitation. As long as the Whig, Taylor, was president, Congress was reluctant to pass it, since it would have been at once vetoed. When Taylor died suddenly, and Millard Fillmore succeeded him, the whole aspect changed; the bill was passed, and signed by the president. In spite of the stringent Fugitive Slave Law, binding the national government to use its energies in returning escaped slaves, "Underground Railways" networked the North, providing an easy escape for the fleeing Negroes. In 1852, Pierce, a New Hampshire Democrat, was elected over General Scott, a Whig candidate.

The slavery conflict shifted its tornado center to the question of the admission of Kansas and Nebraska. Stephen A. Douglas, a young Illinois senator, secured the passage of the Kansas-Nebraska bill, throwing the West open to "squatter sovereignty," or to a decision of the settlers, as to slavery or its prohibition. This bill repealed the 1820 Missouri Compromise: it was the South's pronunciamento to the North that no mere line of latitude could bar slavery from the states and territories. Its passage broke up the tepid Whig party, and caused the formation in 1854 of the Republican Party, which conducted the Civil War and has largely ruled the country since.

"Bloody Kansas" became a battling ground between pro-slavery Southerners and anti-slavery Northerners. A Southern Congressman, Preston Brooks of South Carolina, attacked old Senator Charles Sumner of Massachusetts, as he sat in the Senate chamber, and beat him viciously almost to death. John Brown, an anti-slavery fanatic, massacred five pro-slavery men on Pottawatomie Creek, Kansas. The South threatened secession; but put up a moderate cambric tea candidate, Buchanan, instead of their outstanding leader, Douglas. Fremont, the Republican, lost to Buchanan; and the next four years marked timidity and irresolution on the Southern side, and growing power on the Northern. Meanwhile, the Supreme Court, under Chief Justice Taney of Maryland, in the Dred Scott case, declared that the Constitution was made for white men only; that, not being a citizen, a Negro could not sue in the courts of the United States; and that the Missouri Compromise of 1820 was unconstitutional. Thus the South wrote into the supreme law of the land its most extreme claims.

In the debates over the Illinois senatorship, in 1858, a rangy mid-western lawyer named Abraham Lincoln lost to Douglas; but the nation was so impressed, that in the presidential election of 1860 Lincoln won. The electoral vote was: Lincoln, 180; Douglas, 12; Bell, a straddler, 39; Breckinridge, Southern Democrat, 72. The popular vote was, Lincoln, 1,866,452; Douglas, 1,376,937; Bell, 588,879; Breckinridge, 849,781. Lincoln's popular vote was a million less than the combined votes of his opponents.

THE CIVIL WAR AND THE BLACK RECONSTRUCTION

Although Lincoln's platform was comparatively moderate on slavery, the Southern states acted at once on their threats to secede if he were elected. South Carolina, by a unanimous vote, left the union on December 20, 1860; within six months Mississippi, Florida, Alabama, Louisiana, Georgia, and Texas had followed. Delegates from these seven states met at Montgomery, Alabama, and organized the Confederate States of America. Jefferson Davis of Mississippi was chosen president, and Alexander H. Stephens of Georgia, vice-president. Legally it is probable that the Southern states had the right to secede; New England itself, which now considered secession as treason, had once threatened to secede. But law responds only tardily to social changes, and the United States in 1860 had already become a nation, of which no fragment had a right to withdraw. It took a war to establish this.

Lincoln's inaugural address declared his intention of holding the forts and property belonging to the government of the United States throughout the South as well as the North; but he disclaimed any intention of using force or invasion to make the South return. Buchanan, in spite of a promise to the South Carolina authorities not to try to provision or reinforce Fort Sumter in Charleston harbor, had been persuaded to do so; and the guns on Morris Island had forced the transport to turn back in January, 1861. Lincoln laid the matter before his cabinet, and on April 8th he announced to the South Carolina governor that an attempt would be made to provision, but not to reinforce, Fort Sumter. The South at once proceeded to bombard the fort, and forced its surrender.

This act set the North on fire. Lincoln called for troops; Virginia, North Carolina, Arkansas, Tennessee, joined the Confederacy. General Robert E. Lee, a Virginian serving the United States, saw his allegiance to his state ahead of his allegiance to his country, and resigned to head the Southern armies; although he did not favor slavery. The North had double the population of the South; and nearly half of the South's people were slaves. The South had its immense cotton industry; the North had the vital industries. The South was backward socially; the North, progressive. Hinton Rowan Helper, a North Carolina slave-owner, in 1857 published a book, *The Impending Crisis,* which showed these and other facts, proving the social curse that slavery had become in the South. A keen-witted Southern Congressman had recently declared that slavery had become so unprofitable, that the South would soon have to advertise for runaway slave-owners, instead of runaway slaves. Yet for this bankrupting system the country was drained of its young blood, and the backward South was set backward another half century.

The South had hopes of aid from England, France, and the Northern Democrats; these failed her. The South had a fiery cavalier patriotism, a devoted zeal, in many of its population; contrasted with this was much Northern apathy. This patriotism, this zeal, did not fail the South. The war is a story of Southern pyrrhic victories, too costly to be endured: as the gray line thinned, the reinforced blue tightened perpetually its strangling grip.

For the details, the Northern troops started against Richmond; at Bull Run they were thrown back vigorously. The northern generals proved in the main incompetent, at first, in the East; in the West, Admiral Farragut and General Grant were destructively competent. The critical battle of Gettysburg, in 1863, was lost to the South, largely by the accident that the brilliant J. E. B. Stuart, Southern cavalry genius, disobeyed instructions and rode further than he was ordered, thereby making it impossible for him to win the day. Vicksburg fell in the West, and by the "Anaconda policy" of cleaving the South (in Sherman's march to the Georgia sea, then his pressure northward, while the Northern army of the Potomac squeezed Lee from above) the South was slowly strangled. In March, 1865, Richmond was taken, and at Appomattox Court House General Lee surrendered. With this, the Confederacy fell.

On Good Friday, April 14th, a pro-Southern zealot, the actor John Wilkes Booth, murdered President Lincoln in the capital city as he sat in a box at the theatre. This deprived the country of the merciful president, who would have made the agonizing Reconstruction bearable.

Lincoln's object was to preserve the Union, not to free the slaves. As a war measure, he uttered his Emancipation

Proclamation on January 1, 1863. The 13th Amendment to the Constitution, passed and ratified in 1865, freed the slaves. Andrew Johnson of Tennessee, the vice-president, took oath as President a few hours after Lincoln's death. He was coarse, violent, egotistical, obstinate, and vindictive; he at once locked horns with Congress over his plans for reconstruction in the South. The 14th Amendment, adopted in 1868, gave citizenship to the Negro; the 15th, adopted two years later, gave him the right to vote—a right since uniformly denied in the Southern States, by all manner of legal trickeries. The Reconstruction governments, many with a number of Negro office holders, some of them highly illiterate, gave rise to secret societies of Southern whites, notably the Ku Klux Klan, which succeeded, outside the law, in overturning the Reconstruction governments and restoring the Southern white Democrats to the control. Johnson, bitterly attacked by extremists in Congress, was at length impeached on a technicality; and the impeachment proceedings failed by only one vote.

In 1868 Grant, the military hero, became president. An able general, his deference to men of wealth and his obtuseness in politics made his rule one of the disgraces of our country's history. Graft on a wholesale scale stained the halls of government. In foreign affairs the country prospered, especially in the purchase in 1867 of Alaska from Russia for $7,200,000, or about two cents an acre. Railroad construction boomed excessively after the war, the expansion of credits leading to the punishing panic of 1873. In 1876 a Democrat, Governor Samuel J. Tilden of New York, was elected president; but the Republicans claimed the election for their candidate, Governor Rutherford B. Hayes of Ohio; and a compromise Electoral Commission, consisting of senators, congressmen, and justices of the Supreme Court, with 8 Republicans and 7 Democrats, gave the election unfairly to Hayes by a vote of 8 to 7.

Hayes made a mediocre well-meaning president, using the militia to suppress the railroad strikes of 1877, and encouraging the purchase of silver for coinage. In 1880, General

Garfield of Ohio, Republican, defeated the Democrat, General Hancock, Union hero of Gettysburg. The machine politicians hated Garfield; and Charles Guiteau, one of their followers, assassinated the president. He was succeeded by tepid Chester A. Arthur. In 1884 the Democratic governor of New York, Grover Cleveland, severely trounced James G. Blaine, a brilliant Republican orator, accused of shady dealings with Western railroads and land claims. Cleveland was an aggressive and conservative president, facing down the Senate on the very point on which President Johnson had been impeached, the president's right to dismiss federal appointees. In 1888, General Benjamin Harrison of Ohio, Republican, defeated Cleveland, although the latter led in the popular vote by 100,000. Harrison made an unimpressive executive, and in 1892 Cleveland was returned to the White House.

THE POPULIST DRIFT YIELDS TO IMPERIALISM

Cleveland's second term was marked by Coxey's army, a march of the unemployed against Washington resulting in the anti-climax of the arrest of "General" Coxey for walking on the grass; the violent Pullman strike and riots in Chicago; and a firm insistence on the Monroe Doctrine, in connection with the boundary dispute between England and Venezuela. Meanwhile, the Democratic party was swinging toward the Populist belief in free silver, and a bi-metallic currency standard, though the rest of the world operated a gold standard. A young western demagogue, William J. Bryan of Nebraska, won the Democratic nomination at Chicago in 1896, with his oratoric *Cross of Gold* speech, concluding:

> You shall not press down upon the brow of labor this crown of thorns; you shall not crucify mankind upon a cross of gold.

His opponent, William McKinley of Ohio, was a conservative servant of the great trust organizations, with a campaign managed by wily Marcus Hanna, whose cynical motto is said to have been, "Every man has his price." The electoral vote was a victory for McKinley by 271 to 176 in the electoral college, with a popular vote of 7,100,000 against 6,500,000 for the "peerless orator" of populistic democracy.

Spain's power in Cuba grew more and more oppressive; and American trust interests, especially the sugar combines, jealously coveted the island. The American battleship *Maine* was blown up in Havana harbor, February 15, 1898, perhaps by Spanish mines, perhaps by Americans themselves, or by Cubans desiring American intervention. In a swift war, marked by Dewey's naval victory at Manila Bay, in the Philippines, and Sampson's overwhelming of Cervera's fleet at Santiago de Cuba, the United States triumphed, and Spain crumbled. In the Philippines, a native, Emilio Aguinaldo, set up a Filipino republic, proclaiming himself dictator, and defied the United States. At Paris, in December, 1898, peace was signed with Spain, Spain agreeing to withdraw from Cuba, and to cede Porto Rico, Guam, and the Philippine Islands to the United States. The Philippine insurrection dawdled on until 1902. Cuba was allowed to organize a republic, under our watchful control, which assures the financial advantage to our country; the other conquered territories were organized under the judicial decision that "the Constitution does not follow the American flag." This war marked the beginning of the imperialistic policy of the United States, a policy which still inspires our governmental actions, without loud public advertisement. The unemphasized chronicles of today are full of aggrandizing acts against our Latin-American neighbors, by American marines, soldiers, and fleets.

McKinley was assassinated on September 5, 1901, at the Pan-American Exposition in Buffalo, by Leon Czolgosz, a fanatic whose mind had been unbalanced by reading assaults upon "Czar McKinley" in America's poisonous sensational journals, the "yellow press." Theodore Roosevelt of New York, a sensation-loving and energetic president, took his place. As colonel of the Rough Riders, a regiment composed largely of cowboys, Roosevelt, during the Spanish-American War, had received credit for winning the battle of San Juan Hill, although he and his regiment had merely taken the next unimportant hill. He had been "promoted" by politicians to the vice-presidency, in an effort to shelve his vigor. An assassin's bullet overturned the plans of the president-makers, and the rough rider sat decorously in the White House.

The great trusts, or combinations of capital, were afraid of Roosevelt's noisy threats of "trust-busting." Efforts sponsored by him did no lasting damage. His encouragement of irrigation in the arid West, of forest conservation, and of the Panama Canal, started during his term of office, were constructive; even though he acquired Panama from Colombia by encouraging a revolution there, protected by American gunboats—another bit of international brigandage. After his second term, Roosevelt picked his Secretary of War, William Howard Taft of Ohio, as his successor; and Taft easily defeated Bryan. Roosevelt, still avid for power, disowned Taft's feebly conservative achievements, and in 1912, failing to secure the Republican nomination, he entered the field against Taft and Woodrow Wilson, a former president of Princeton University, as candidate of the Progressive or "Bull Moose" party. Roosevelt's policies had progressed in the direction of the state socialism of Germany and England; he saw trusts now as inevitable, and disowned "busting" them in favor of strict government regulation. This split in the Republican ranks gave the election to Wilson, who received some 6,000,000 out of 14,000,000 popular votes, and 435 electoral votes to 88 for Roosevelt and an abject 8 for Taft.

Wilson was a bookish man, full of arrogantly high ideas of the president's role; epigrammatic Roosevelt described him as a "Byzantine logothete." Mexico, whose rich oil and mineral deposits were greedily coveted by American capitalists, was soon maneuvered into a ferment of unrest, culminating in American intervention against Huerta, the Mexican president-dictator, in 1914. The rise to power of the more moderate Carranza ended the strained situation; and America now turned its strained attention to the crisis of the World War. She was able to direct her energies toward the war with more unity and integration, because the labor movement in the industrial field had been from the start divorced from the labor movement in the political field. The latter, the Socialist movement, had been brought over from Germany and continental Europe, and had reached enough strength to win a few important mayoralty campaigns, and to elect a small number of congressmen. But the foreign tag was never eliminated, and the Socialists failed to build up a typically American political party. Popular feeling toward economic reform was dissipated in the populist and similar short-visioned movements. On the industrial field, labor finally crystallized into the American Federation of Labor, largely anti-Socialistic in its attitude. Strikes, especially in the railroad, mining, and textile industries, were often of long duration, and marked by callous brutality, especially on the employer's side; but in politics the American laborer remained predominantly conservative.

IMPERIALISM AND THE WORLD WAR

The World War was preceded by a scramble of the nations for world empire. England had held Canada since its conquest from the French, in 1763. In 1770, an English navigator, Captain Cook, took possession of Australia in the name of England, and this isolated continent developed into the 1900 Commonwealth, democratic in government and suffused with progressive ideas. New Zealand, acquired by treaty with the native Maoris in 1840, became a similar home of experiments in social reform, tending toward democracy. South Africa, settled by Dutch Boers of independent spirit, and turned over to England by the Congress of Vienna, fought for its independence in 1899, the Transvaal and the Orange Free State uniting against the English overlord. England won, in a campaign conducted with disgraceful inefficiency; and in 1910 elevated South Africa into a Union of South Africa, modelled on the Canadian and Australian Commonwealths. England had other vast properties in Africa; and she held the whole of India, taken from France and the native rulers in the 17th and early 18th centuries.

Meanwhile, the world was being knit together by the Suez Canal (1869) and the Panama Canal (1915); and by immense railway, steamship line, postal, telegraph, and cable expansion. The Europeanizing of the world was hastened by investments of European and American capitalists in the railroads, oil wells, and mines in countries called backward. By 1900, England had foreign investments totalling $10,000,000,000. At home, the wages paid to labor, in all the capitalistic countries, left capital a vast surplus of the manufactured products, which the wages could not purchase; and so the capitalists had to develop imperialism, the sway over non-manufacturing markets, to absorb this unconsumed surplus. This imperialism took the triple form of annexations, protectorates, and trade treaties; under any form, it held the market under a mailed fist.

China, seeking to stop the opium trade which was ruining its population, was forced by imperialistic England, in 1839, to allow this curse of civilization to ravage the yellow land unimpeded. The United States in 1844 took advantage of China's helplessness, to demand special commercial privileges. Napoleon III, supported by England, in 1858 forced China to open its ports to him. Japan, awakened to Western imperialism by the Occident, became a manufacturing country, and coveted China's markets. In a brief war, during 1894 and 1895, she defeated China, and entered into a deadlock with grasping Russia over the division of despoiled China. Germany, in 1897, alleging as an excuse the murder of a missionary, planted German civilization in the unlocked Chinese town of Kiaochow; Great Britain, as a counter move, wrested Weihaiwei, between the German and Russian acquisitions, from China.

In 1900, China rose against the foreigners in the Boxer rebellion, the Boxers being a group of patriotic nationalists. Japan, Russia, Great Britain, the United States, France, and Germany, acting together, put down the uprising, and exacted heavy indemnities from the abject Orientals. Meanwhile, Japan and Russia went to war in 1904, and in a year and a half the Oriental islands acquired valuable Chinese rights from Russia. In 1912 China became a republic; its history since then has been a series of cloudy revolutions and uprisings, culminating in the vigorous 1927 anti-foreign warfare. Meanwhile, England, Germany, and France subdivided most of Africa, with Belgium holding the valuable Congo regions, where the natives were treated with inexpressible cruelty to spur on their production of rubber. Egypt was taken over by England, and ruled with an iron hand. Thus the world was divided among the imperialistic grabbers.

Russia, up to 1914, was still the most backward European nation; although in 1861 the tsar emancipated the Russian serfs from their surviving medieval serfdom. Successive tsars persecuted liberals and radicals with dreadful harshness, jailing most of them, and exiling them to the living hell of frigid Siberia. In 1881 Alexander II, on the eve of granting rights to the insistent liberals, was assassinated. A railroad was built across Siberia in 1900. Terrorism continued to stalk through Russia, as the people's answer to red-handed autocracy. In 1904 and 1905 the socialists and anarchists of Russia commenced an uprising, which was put down by force and lying promises. During 1906, 9,000 people were killed or wounded for political reasons; and, until the revolutions of 1917, the tsar continued to rule as "Autocrat of all the Russias."

The Balkan states became the focal point of European intrigue. One by one these states, Serbia, Greece, and others, freed themselves from Turkey. In 1854-1856 France and Great Britain joined with Turkey against Russia, to prevent the latter's access to the Mediterranean by taking Constantinople. Thus Christian joined with the Moslem against Christian for commercial purposes; and this Crimean War, made memorable by the charge of the Light Brigade at Balaklava, humbled Russia, and set up Turkey as a buffer state against further Russian expansion. By Russia's efforts, the Sultan was forced to recognize the freedom of Serbia, Montenegro, and Rumania in 1878; a recognition ratified by the allied powers shortly thereafter, together with Bulgarian dependence on Turkey and Austrian control over

Bosnia and Herzegovina. In 1908, Bulgaria freed itself quietly. The Greek struggle against Turkey in 1897 resulted in a defeat for the greedy little European land; and in 1908 liberals in Turkey, the "Young Turks," forced a constitution upon the aged sultan. In 1911 and 1912 Italy took Tripoli and Rhodes from Turkey, despite European protests.

In 1912 Greece, shrewdly managed by its statesman Venizelos, joined with Bulgaria, Serbia, and tiny Montenegro for a war against Turkey. The Turkish force crumbled like stale bread; and Austria, alarmed at Serbian progress, ordered the Balkan state to surrender the port of Durazzo, which it had taken. Russia failed to act on Serbia's side, and the smaller country backed down. Immediately Bulgaria turned for a month of atrocious battling against Serbia and Greece, concluded in the Treaty of Bucharest, which left Turkey only Constantinople and Adrianople in Europe, with Albania freed, and the rest of Turkey in Europe partitioned among the four fighting Kilkenny cats, the Balkan states. This war revived all the old hatreds between Russia and Austro-Hungary, and formed the vestibule to the most costly war Europe has ever known. Europe, since 1870, had been arming at a terrific rate. Great Britain spent its chief energy upon its navy, foremost in the world; although Germany challenged this naval power, and other nations entered also upon the costly race. For land forces, when the World War opened, Great Britain had a mere 200,000, scattered over the world; Germany and France had each over 4,000,000 men in their armies, Russia between 6,000,000 and 7,000,000, and Austro-Hungary over 2,500,000.

There had been movements for European peace, notably the Hague Conference, inaugurated by Tsar Nicholas II in 1898, and held again in 1907. Due to opposition by Germany and Austria, no limitation of armaments was agreed on; and the rules "civilizing" warfare were promptly scrapped by all of the combatants, when war commenced. The two international sore spots were imperialism, which had almost brought France and England to blows over Egypt and the Sudan in 1898; and the festering Near Eastern question centered around the Balkan states. England was allied with France, with Japan, with Russia; Germany, left out, had to content itself with a Triple Alliance composed of herself, Austria, and Italy, the latter a weak reed when the World War occurred. In 1911 Germany almost commenced war with France over which should control Morocco; France retained Morocco, by ceding Germany a strip of her Congo territory.

THE NEAR EAST IGNITES THE CONFLAGRATION

When Turkey's government changed in 1908, Austria boldly annexed Bosnia and Herzegovina to her empire, to prevent Serbia from ever obtaining them. Serbia was outraged, for she had determined to join these territories with herself, in a south Slavonic state. Russia was angered, but Germany announced firmly that she would support Austria. Bosnia would have meant an outlet for Serbia to the sea; Austria took that. Serbia planned to reach the sea through Albania; Austria set up a separate power here, again hemming Serbia away from the sea. The Serbians now hated Austria as bitterly as they had hated Turkey.

Germany, planning a railroad from Berlin to Bagdad and the Persian Gulf, to control trade with the Orient, looked askance at Russian ambitions, expressed in Serbia's position. The year 1913 saw renewed "preparedness." Germany increased its standing army; France retaliated by increasing the active service in the army from two to three years. Even Belgium introduced universal military service, since Germany had run its railroad tracks to her borders, indicating an intention to pass through Belgium when the fighting began. Germany was the more strengthened psychologically by its interpretation of the stern philosophy of Nietzsche; and it saw that, in a few years, the new French military service would put the French army ahead. It realized that it was in a better position now than it could ever be to strike, and to crush the rest of the world. The less united rest of the world stood prepared, and anxious, in the main, for the conflict.

When men desire that race suicide called war, an excuse for its coming is not hard to find. On June 28, 1914, an incident happened which sufficed for a pretext. On that day Archduke Francis Ferdinand, heir to the Austrian throne, and his wife, were assassinated while on a visit to Bosnia, by Gavrio Prinzip, a fanatical Serbian student. Serbia had warned the archduke not to visit the place, for fear of such fanatical conspirators; Austria in turn blamed Serbia for the conspiracies. After a month's delay, on July 23rd, Austria sent Serbia, not a protest, but a 48-hour ultimatum, commanding Serbia to suppress all anti-Austrian propaganda; to dismiss from army and all civil offices all persons distasteful to Austria; and to allow Austrian judges to sit in Serbian courts, to bring the guilty to punishment. Serbia, in desperation, agreed to these conditions, except the last, and offered to submit that to the Hague Tribunal. This Austria refused to do; she had her excuse for the war, and was determined, with Germany's backing, to discipline Serbia, its ally Russia, and the other Allies, England, France, and Japan. England was expected to be so weakened by dissension in Ireland, Egypt, and India, as to be ineffectual; France was laughed at as a nation of easy-living weaklings; Russia, as a land of barbarous serfs. Alarmed English diplomats begged Germany to pacify Austria; but Germany, realizing that she was ready, and that France and Russia were not yet as prepared as she, saw no reason to stop the immediate coming of the war. It was the firm belief of Germany and her allies that England, France, Russia, and Japan were planning a war of extermination against the Central Powers; and Germany figured that, if the war were coming in the near future in any event, it would be better for it to come when Germany had a slight advantage in preparedness. The peoples of all the nations were taught, by all the sources of information available to them, that the prospective war was a holy one, in defense of some high code of international morality, or some injured national honor: that each land was waging a defensive war. So the lie-led peoples came up to the slaughtering-block.

On July 28th, Austria declared war on Serbia. Russia began to mobilize; Germany, announcing that this meant war on her, declared war on Russia on August 1st. She demanded of France what France intended to do; France's evasive answer was partially responsible for Germany's declaration of war on France, on August 3rd. Germany's troops were marching on France, Allied historians state, a day before war was declared; the historians of the Central Powers say that French troops were on the march before the declaration. Germany gave Belgium twenty-four hours to permit German troops to cross the land; if not, Germany would treat Belgium as an enemy. Belgium refused to agree. England gave Germany twelve hours to declare that she would respect Belgian neutrality. The German chancellor refused, telling England that she ought not to enter war for "a scrap of paper." On August 4th, outraged by this description of a treaty, England declared war on Germany; with or without the tactless German remark, it seems certain that she would have found an easy excuse. Japan and Montenegro soon followed England's lead, and Turkey allied itself with the Central powers. Allied propaganda spread the idea that the Balkan issue was not fundamental, but that the war had been caused by the Kaiser, the German war-lord. German propaganda taught the Germans that they were waging a war to protect their fatherland, invaded by evil nations outside; that the Slavs threatened in the East, France was on fire to avenge 1870, and England was the sly promoter of the whole situation. Thus, for the sake of efficiently planned lies, men began this wholesale murder of their brothers.

THE WORLD WAR

The triple German assault advanced on France through Belgium, neutral Luxemburg, and from Metz toward Nancy. Belgian resistance greatly aided hurried French preparations. Belgium was overcome, and, despite English aid, by August 20th Paris was only twenty-five miles away from the front of the German line. The French government moved to Bordeaux, and Paris prepared for a siege. The French victory of the Marne drove the Germans back slightly, and caused them to intrench for a long campaign. For four years the battle line remained largely stationary, in spite of the sacrifice of hundreds of thousands of men on both sides. In the East, Russia started well, but was balked by German and Austrian alike. The British invaded Mesopotamia, and took Bagdad and then Jerusalem. An attempt to take Constantinople was a discreditable failure. Italy, bargaining backward and forward between both parties, called by the Central Powers the Judas among nations, at length deserted the Triple Entente and joined the Allies, for a promised price.

On the ocean, Germany hugged the ports, and so lost her world commerce. Her improved submarines, the U-boats, were able to steal out of blockaded ports and sink English merchantmen; in retaliation England had neutral ships stop at England's ports to be searched for contraband, whose definition she expanded from munitions of war to include even foodstuffs. Germany declared the waters around England in a state of submarine blockade, and began to sink neutral ships here as well. Thus the great liner *Lusitania* was sunk on May 7, 1915, with a loss of some 1,200 persons, including over 100 American citizens. Germany claimed that the ship carried munitions; England denied this. Germany was thrown back in its assault on the fortress of Verdun, and the Anglo-French drive along the Somme, which saw the first trial of the land ironclads, the tanks, able to crawl through barbed wire and to climb steep pits, gained a few miles at a cost of more than 1,000,000 lives on each side.

Meanwhile, Austria drove Italy back; and, when Russia attacked Austria in the rear, the Italians regained more than their lost territory. Rumania, inspired by this, joined the Allies; and, apparently betrayed by her ally Russia, was ravaged by German troops. Airplanes became an essential horror of the war, including air raids on England in huge Zeppelin dirigibles, which killed a few thousand English civilians, and destroyed some property. Germany's assaults on neutral ships, which had been warned against nearing English ports, at length brought the United States into the war.

Woodrow Wilson, the president, had been reelected in 1916 on the platform, "He kept us out of war"; he had declared that we were "too proud to fight." Strong influences among capitalists of the United States urged us to side with the Central powers; stronger influences pressed punishingly in favor of war against Germany. Wilson dallied, dispatching note after note to Germany. On April 2, 1917, his message to Congress stated that Germany had practically declared war on the United States; and said that the free and self-governed peoples of the world must combine "to make the world safe for democracy," or no permanent peace would be possible. It was a war, it was generally said and believed, to end war. So the United States entered; in May, 1917, adopting conscription, or enforced military service. Many small nations followed our example. The war had become a World War at last. The Allied rulers commanded 1,340,000,000 people; the Central Alliance, some 160,000,000. Scarcely 190,000,000 of the world's inhabitants remained neutral. These figures do not give the actual odds, since the majorities of the peoples of India and China did not aid either side, and since, after 1917, the Russian millions could not fairly be counted on either side.

THE RUSSIAN REVOLUTIONS, AND AFTER

In March, 1917, Russia, one of the chief fighting nations, its population outraged by repeated proofs of tsarist incompetency, forced its tsar to abdicate, and moderate socialists, led by Kerensky, took over the power. In November the dissatisfied extremists, the Bolsheviki (those who stood for the majority or maximum of demands against the employing class), led by Nicolai Lenin and Leon Trotzky, overturned the conciliatory Kerensky regime, and installed a "dictatorship of the proletariat," along strictly Marxian socialist lines. Private property was at once declared abolished, and communism theoretically established. The Bolsheviki called upon the nations to assemble for a peace conference, much as Muhammad long before had ordered all the kings of earth to turn Moslem. On their ignoring this demand, the Bolsheviki opened up the Russian archives and published the secret treaties, blastingly advertising the selfishness of the old-fashioned diplomacy. On March 3, 1918, at the Treaty of Brest-Litovsk, Russia made peace with the Central Powers.

The great German drive commencing March 21, 1918, was checked; and the alarmed Allies put all their troops under the head of one man, the French General Ferdinand Foch. In April a second German offensive commenced, and was halted. United States troops had been arriving since June, 1917, under the old Indian fighter Pershing. More than 2,000,000 eventually were in France, making a distinguished record. Their battle casualties—killed, wounded, missing, and prisoners—amounted to about 300,000. On every front the Allies began to triumph. On September 29, 1918, Bulgaria, her army routed by combined Serbian, Greek, British, and French troops, asked for an armistice, which was granted on terms of unconditional surrender. On October 31st, Turkey gave up the fight, surrendering on the same abject terms. On November 3rd, Austro-Hungary unconditionally surrendered—an empty shell surrendering; for the northern Slav republic (Czechoslovakia), the southern Slav republic (Jugoslavia), and Hungary were already in revolt. The Hapsburg ruler of Austria resigned on November 11th. Germany was about to crumble; she had expressed her willingness to make peace on Wilson's "Fourteen Points," enunciated in a speech the preceding January. We will reach these points later.

The amazed world, on November 9th, learned that Kaiser Wilhelm II had abdicated, and fled to Holland, ending the brief tinselly glitter of the Hohenzollerns. On November 10th a revolution broke out in Berlin, and a socialist leader, Friedrich Ebert, assumed the duties of chancellor. On November 8th the Allied terms were communicated to Germany—evacuation of all the territory the Germans had occupied, and of the western Rhine bank, which Allied troops were to occupy; all troops to be withdrawn; Germany to hand over war fleets, submarines, war material, and railroads and roads on the west bank of the Rhine; to free all war prisoners, and restore the money and securities taken from Belgium; and that the blockade of Germany was to continue. Germany accepted these bitter terms, and on November 11th the armistice was signed at Réthondes.

The war, which had seen 60,000,000 men mobilized, 8,000,000 killed in battle, and 18,000,000 wounded, and more than 17,000,000 civilians killed by famine, disease, and massacre, was over. The national debts of the Central Powers had increased from $5,000,000,000 to $44,000,000,000; the Allied debts, from $21,000,000,000 to $86,000,000,000. Fully 5,622 British merchant ships were sunk, nearly half of them with their crews on board. The French Chamber of Deputies calculated that the German damage in northern France exceeded $13,000,000,000. This is a small fraction of the harm wrought by the war.

THE TRUCE CALLED PEACE

Wilson's Fourteen Points included:

> Freedom of the seas in peace and war.
> Removal of all economic barriers.
> Reduction of armaments.
> Restoration of Belgium.
> The formation of an association of nations, to insure the independence of small as well as large nations.

In January, 1919, the Allied peace commissioners met at Versailles, to draft the peace. The five leading powers—Great Britain, France, the United States, Japan, and Italy—directed the conference. Canada, Australia, New Zealand, South Africa, and India had delegations; twelve Latin-American republics, Belgium, Serbia, Greece, Rumania, China, Siam, Liberia, and newly organized Poland, Czechoslovakia, and Hejaz, were represented—thirty-two countries in all, from every continent. Germany, Russia, and the neutral powers were not admitted.

In spite of protests, the "Big Three," Clemenceau of France, Lloyd George of England, and Wilson of the United States, met in secret and made all the vital decisions. Wilson by word insisted upon his Fourteen Points; his practical weakness made him putty in the hands of the shrewd European diplomats, and each of his points was carefully blunted and emasculated into some absurd caricature of the original demand. The draft of the peace treaty was finally accepted by the delegates; Germany was to cede Alsace-Lorraine to France, and Posen and West Prussia to Poland; Danzig was to be left free; Germany had to surrender all her colonies to Great Britain, France, and Japan, as "mandatories" to be administered under the League of Nations; Germany's navy in large measure, and all of her airships and submarines, had to be surrendered. Her army was to be limited to a maximum of 100,000 men, and compulsory military service was abolished; with the west bank of the Rhine occupied by the Allies until all of the terms were carried out. The major matter of financial reparations was postponed for two years, with Germany required to make a preliminary payment of $5,000,000,000. She was to build ships for the Allies, to replace those sunk; to deliver huge quantities of coal to France, to compensate for destroyed coal mines. In spite of bitter protests, Germany's representatives signed the treaty on June 28, 1919.

The League of Nations, Wilson's pet provision in the treaty, was to be organized with an Assembly composed of one vote to each country, including the British dominions; and a Council made up of the five great powers previously named. Germany, her allies, Russia, and Mexico were temporarily barred. All important decisions required a unanimous vote. Thus the league was far more ineffective than the Articles of Confederation uniting the liberated American colonies in 1777; it lacked completely an executive, its judiciary department lacked real power to enforce its decrees, and the legislative, requiring a unanimous decision, was little more than a figurehead.

In the United States, the Senate refused to accept the league; and, in the election of 1920, the Republican party, opposing it, won in the person of an Ohio senator named Harding. On July 2, 1921, Congress declared that the war with Germany was over; and soon afterwards a brief separate treaty was signed with the humiliated Prussians. Meanwhile, Europe continued to be troubled. Italy wrested the port of Fiume from Jugoslavia. Russia, with a tremendous "Red Army" organized by Trotzky, defeated reactionary attempts by Kolchak, Denikin, Wrangel, and others, to put down the Bolsheviki—all these attempts being aided by the Allies.

Advocates of the League of Nations claim that it has already prevented minor wars in Europe. The League's court has functioned passably. A conference in Washington, in 1921, did place a ratio for naval building, but failed to limit land armaments, and merely denounced modern chemical warfare. Attempts have been made to have the League declare aggressive war a crime. In 1925, at Locarno, the greater European powers met and agreed upon treaties, furthering the cause of international peace. Treaties now have to be deposited in the archives of the League, subject to public inspection—a step against secret diplomacy.

Russia, so far, has seen the Bolsheviki maintained in power, largely due to their altering of theoretically strict communist practices for somewhat autocratic state and private capitalistic practices. In spite of these regressions, the land is tremendously improved in education and other civilizing forces. The labor and socialist strength throughout much of Europe is weakened, especially in Germany, in England (where the brief control of the socialistic Labor Party has come to an end), and in Italy, where the semi-socialistic nationalists, the Fascisti, under Mussolini, have driven out the socialists. The election, as president of Germany, of the war idol General von Hindenburg, indicates the persistence of the militarist ideals there, just as the United States has often drawn its presidents from such battle-haloed veterans as Washington, Jackson, Taylor, Harrison, Grant, and Roosevelt. Yet, after all, this war was believed by millions to be a war to end war; to make the world safe for democracy; to preserve the rights of little nations; and to end the militaristic attitude of Prussia, or Prussianism. Its conclusion has seen kings, autocracies, dictators, and despoilers left in control, or stealing back into power at the first opportunity; it has seen many little nations outrageously despoiled; and has witnessed an inevitable increase in the Prussianistic spirit in England, France, the United States, and others of the Allies—a spirit which today threatens the future peace of the world, as surely as preparedness and imperialism threatened it in the dark decade between 1904 and 1914.

TODAY: AND THE PROSPECT FOR TOMORROW

A glance at the newspaper headlines on any typical day furnishes a revealing cross-section of the minds of the men of today. These newspaper captions indicate with what appalling effectiveness the propaganda in favor of war is dressed up, to control the minds of the people generally; and how slightingly and slurringly efforts toward peace are regarded. Man has learned to organize hatred, in the form of wars and racial prejudices, with dreadful thoroughness; man has not yet learned to organize the love forces. This is a quiet Sunday in 1927: let us see what our sources of information, the newspapers, have to say about the state of men's minds.

Let us pass by the noisome private scandals, and turn to the news of international affairs. Here is a cable from London: "British Find War Guilt in Pact System. Claim Nation Entered Conflict with Clean Hands." Each nation, of course, claims the same; English publicity is more potent in our press than that from other sources. "Further British Proof of Corpse Factory Yarn" heads a story corroborating the revelation by General Chartres, of the British army, that the story that the Germans used human corpses for soap and fertilizer was invented during the war by the British wartime propaganda. A supplement to the story says that it was invented on the continent, and adopted by the English. The one element absent is any hint that there was any truth in the story, so widely circulated and believed, to the detriment of the Germans. Another headline reads, "Britain Puts Lid on 'Invisible Ray' "—the English decision to keep secret the invention of an invisible searchlight for wartime use.

The headlines alter to China. The turncoat Lloyd George "Scores British Jingoes on China"—or scolds Englishmen demanding further aggression against China. Side by side with this, scareheads see "Jeopardy to European Prestige and Commerce in Orient," if the Chinese rebels succeed in securing a rule of Chinese over China. The situation switches to Germany. The war ended in 1918: the headline reveals that the Allied troops still occupy the German Rhinelands, and that they may be withdrawn during the current year. Here is a leading publicist, asserting that the United States will be plunged into war with Japan in two years. Here is the exclusion of a critical United States senator from Haiti, where American marines have padlocked popular elections and sessions of the Haitian Congress for some ten years. Here is a page about the situation in the Philippines, the highlight being in the headline "Filipino State Set up in 1948, Shuster's Plan"—the postponement of self-government for the islanders for more than a score of years more. Here is the report of Secretary of War Davis, attacking "Delusions on U. S. Defense"—in other words, demanding more widespread "preparedness" for future wars. From a girl's school, Agnes Smith College in Decatur, Georgia, comes the telegram that an address by Mrs. Lucia Ames Meade, vice-president of the National Council for the Prevention of War, was cancelled by the college authorities, because of protests of the American Legion, the local Decatur post being directed by the richest man in that section of the state.

Internal affairs do not appear in a more favorable light. In addition to the story of a lynching in one of the mid-Southern states, there are both news stories and editorials based upon the charge of ex-President Taft,

> The administration of criminal law in the United States is a disgrace to civilization.

There is the detailed account of talking over the radio between New York City and London—a positive step forward. A dispatch from London says that a $10,000 monument is to be erected at Hyde Park Corner,

> In memory of the birds, beasts, and fishes who gave their lives for the empire in the World War. The fish referred to are goldfish killed in the gas tests.

The picture section has one fine halftone headed, "A Victim of War Fury. The famous cream horses of Hampton Court that pulled King George's state carriage were banished during the World War to menial work, because their origin was Teutonic."

If these headlines, and the stories developing them, are glanced at thoughtlessly, they will seem natural enough: they will fit in with the biases, prejudices, and propaganda-made illusions which we unconsciously must assume, as a result of the immense cumulative effect of similar propaganda in the past, beginning with our earliest teachings from parents, school teachers, and preachers. They will just seem like one day's news: a bit boring, unworthy of thought. We lay down the paper, or turn to the news of sports, the theatre, bargains, the stock market. . . .

By an effort of will, remove from your heart the coverings of bias and prejudice that have so long cloaked it away from truth: look at these stories from the serene eminence of the world's centuries of history, its vistaed mountain-ranges of blunders, its narrow valleys of success. This cross-section of the world now looks hideous, weighted with immense bloody trouble for the future, and, in its totality, from a thinking man's standpoint, almost insane.

Imperialism still rules the world. The greater capitalistic nations still hold much of the world in subjection, and prey on them. England holds unwilling India, Egypt, Ireland, and other subjects. America has the Philippines, and a wary hand already despoiling Mexico and Latin-American countries. Each powerful nation has its claws half-opened against its next prey. Each nation has its internal plague spots: we have our treatment of Negroes in the South, of Japanese on the Pacific Coast, of the Indians, as well as discriminations against certain racial groups.

Military aggression still rules. The world is still hatefully over-armed; and the warmakers, hailed as national heroes, denounce seekers for world sanity and peace as "dirty pacifists," traitors, and by worse names. The race for military, naval, and air supremacy still continues.

The economic system of capitalism still dominates most of the world, defended as moral and beneficial by its supporters, denounced by radical labor.

The European nations, the United States, Asia, Japan, still view each other with jealous eyes. Any decade, even this present one, may witness another general martial conflagration over the whole European-American-Asian world, far more destructive than the last; for more terrible engines of war's destructiveness are invented constantly. If such a conflict or series of conflicts develops, it seems inevitable that the white races will destroy themselves, and that an Oriental or African power will ultimately supplant them as leaders in world civilization. This may sound unduly pessimistic: the man who is an unrelieved optimist, in the state of the world today, is blind. The only salvation for mankind is effective world peace; the only effective method of obtaining this is by a voluntary United States of the World, where national prides and prejudices are surrendered together—a world state with effective executive, legislative, and judicial departments, with all tariff walls lowered; and, ultimately, with some solution of the industrial problem that will end all forms of exploitation.

Are there any prospects for world peace, effective world federation, or an end to industrial disorder and exploitation? The increasing participation of women in political and social life is a promising sign. At first its effect must be reactionary, for women are preeminently conservative; in the end, it must substitute judgments based predominantly upon human life and happiness, for judgments based predominantly upon profits and economic success. The growth of power in the labor movement, for all its constant setbacks, is another. Neither is too promising. So many insidious forms of propaganda and superstition are used to cripple men's minds, by ignorance, illusion, and organized hatred, that the case seems far from bright.

Most of all, modern scientific research wars against the old narrow-mindedness or parochialism of outlook, the old superstitions and national rivalries. Practical science has united the world into one neighborhood; has established the kinship of all races of men, and of the animals as well; has made a world of happiness and comparative leisure, without exploitation of savage, barbarian, or civilized man, a workable possibility. Even though the feminist and labor movements, and the scientists themselves, are utilized frequently by the grasping oppressing classes, it still remains that their spirit is one of emancipation, and that their effect is to lift man's soul out of the mire of hatred into the light of comradely work with the rest of mankind.

Man's real enemy, or opponent, is his environment—savage beasts, intractable plants, gruelling climates, the germs of disease. Perhaps it would be truer to state that man has no real enemy; that the environment is his material to work on. Under the guidance of science, he is rapidly subduing this material to his own betterment. The collective object of men is the socialization of human achievement—achievement consisting, not in stored wealth of any kind, but in knowledge—knowledge especially of processes, of how to make and do things, as well as of how the world has become what it is. Efforts toward this socialization of achievement, this throwing open of the treasured knowledge and methods of the past to every boy and girl, every man and woman, in the world, proceed slowly, but there is progress. Group judgments, giving rise to hatred or love, are never so sound as individual judgments; group prejudices and biases must be discarded, and the equal opportunity thrown open to every living human being to learn all that society has learned, and to use this knowledge to lift society higher. Some will selfishly fail or refuse; and an unbelievably large number will glory in the task. For the highest selfishness is unselfishness, or making the world lovely for all others, that it may be lovely for one's self.

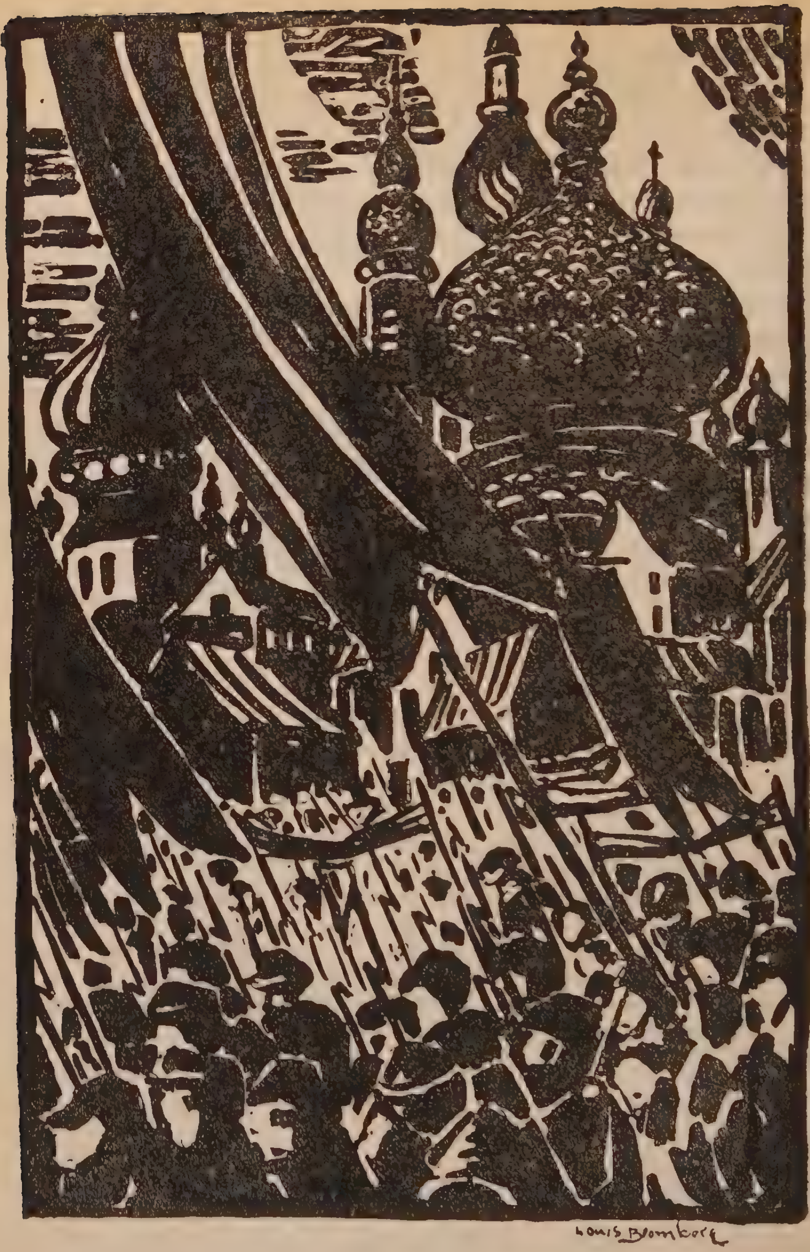
Our minds today are so warped by trained hatreds and prejudices, by hothoused petty selfishnesses, that it is almost impossible to think forward into the finer, freer air, in which men will live, breathe, and think—if mankind continues to grow toward its manhood, and lays aside its harmful cruel adolescent bickerings, ignorances, and superstitions. If our life reaches toward true civilization, the time for glorification of oppression has passed; the oppressor will be taught soon enough that the hour has passed for him to play the petty Nero in the great upward climb of human life. A wise man has pointed out that force is the midwife of progress; and, while progress will come most graciously with unstained hands, if conflicts must come, based on a real idealism toward world brotherhood, it will not be the first time that men have stepped forward brightly into conflict or death, for the sake of a lovelier tomorrow. The worthy man or woman today will bend himself or herself to think these matters out to the very end, and will do his or her share toward furthering the wide causes which may make a heaven on earth possible. Its hour will perhaps not be in a near tomorrow; but it will have its hour.

ADDITIONAL READINGS

The French Revolution, by Thomas Carlyle, is an impassioned and moving picture of this early overturn of ancient oppressions.

THE UNITED STATES. *American History,* by David Saville Muzzey (Boston, 1911), is the best short account of the subject. The earlier edition, referred to, is superior to subsequent editions, where the attitude grows somewhat reactionary.

THE WORLD WAR. No adequate summary of the World War, fair to both sides, has yet appeared. The period is still too recent for such a study. Any treatment of the theme that is interesting may be read, in the light of the ample summary in this book.


Louis Blomberg

Let the red banners torch the sky!
Let kings and hateful kingliness die!
Let the people, out of their agony,
Bless the mirage that they are free.

BOOK II

THE OUTLINE OF SCIENCE

I. CLASSIFICATION OF THE SCIENCES; MATHEMATICS

THE DATA OF THE SCIENCES

This morning, you slept late. You were finally awakened by sunlight beating upon your eyes. After dressing, just as you looked at your watch to be sure of the time, you were called down to breakfast by your wife or some member of the family. You ate your breakfast, meanwhile talking to your wife or those at the table. Did you know that all the great sciences, in practical application, have aided this start of your morning? Do you know which of these sciences aided or regulated each step in this beginning of your day's activities?

The sun's light (studied in astronomy; its effect on your eyes, in physics) ended your sleep (studied in biology). Your dressing (motions studied in physics, clothing in sociology) was followed by looking at your watch (involving mathematics, the measuring-rod of the sciences, and astronomy, the computation of time by the solar year and its divisions, as well as physics dealing with sight, and the psychology of registering it). Hearing the call for breakfast (involving physics dealing with hearing, and biology and psychology, in understanding and acting upon the call) was followed by eating (involving physics, and commencing changes studied in chemistry and biology). The conversation required psychology, the physics of speech, and sociology, or your relations with the social group. Other minor sciences have also contributed. This brief prelude to your day has called upon every major science to make its running smooth and effective.

Science has been defined by Whetham as "ordered knowledge of natural phenomena and of the relations between them"; and, more aptly, by Lester Ward, as systematic reasoning about facts, rather than the accumulation of facts. All phenomena, or all things perceived by any of the senses, are natural phenomena; hence, science consists in a systematic reasoning about any or all the facts in the universe.

The number of these facts is beyond computation. The facts concerned with any one room, or the objects contained in it, are beyond computation. The facts concerned with any one object, as this *Outline of Man's Knowledge,* are beyond computation.

This book contains more than 210,000 words.

Averaging 5.5 letters to a word, this means 1,155,000 letters.

The single letters composing the book have 1,334,025,000,000 positions in reference to themselves and the other letters.

The relations of each pair of letters, and each group of three, four, five, and more letters, to each single letter, and each group of letters, runs into many trillions.

No two letter-impressions are exactly alike: a study of each detail of each letter, similarly treated, carries us far higher mathematically.

This book is composed of matter; matter, of molecules; molecules, of atoms; atoms, of protons and electrons. The number of these is increasingly, infinitely large.

The relations of each proton and each electron in the book to each other proton and electron would run to a number which would do far more than girdle the globe.

There are an infinite number of other facts about this book—one infinitesimal object in a vast universe. The total number of the facts in the universe is infinitely inconceivable. If science is a systematic reasoning about facts, and the facts are so innumerable, how is it possible for man's brain, and his brief time for study, even to scratch the surface of recognizing them, much less reasoning about them?

THE ORDER OF THE SCIENCES

The answer lies in the word *systematic.* What science does, or should do, is to furnish a framework, into which all the natural phenomena in the universe, all the facts, may be conveniently fitted. Whenever a man or woman, who has mastered this simple framework, encounters a fact, he promptly files it away in its appropriate pigeon-hole: he classifies it. Reasoning about facts consists simply in noting the similarities and dissimilarities of any two or more facts in the universe. There is always a relationship to be noted, by reasoning, between any two facts in the universe, no matter how far apart they may seem to lie. An idea or expression of this relationship, stretching over two or more facts, is called a generalization. The power of generalization, constantly widening, is man's highest power of thought.

We expect science, then, to furnish us with a systematic, logical division of the facts of the universe: a classification of the sciences. With this we must begin. Equipped with it, such a day's discoveries as these:

> That the cube of 3 is 27.
> That some baby barnacle-like shellfish swim about freely, before becoming affixed to the rocks.
> That the unsociability of the nitrogen atom is the basis of the great explosives.
> That human agriculture began with the custom of burying the dead.

—these discoveries of facts are promptly filed away in

> Mathematics,
> Biology,
> Chemistry, and
> Sociology,

there to be used as materials for the brain's reasoning. Such isolated facts no longer wander about homeless, floating, unattached as baby barnacles, in the mind: they are located systematically where they can be of use. What, then, is the proper systematic and logical classification of the sciences?

First of all comes

> 1. Mathematics,

the measuring-rod of the sciences. It is enough to say here, subject to subsequent explanatory correction, that mathematics is the science dealing with number and quantity, "the science of distinct and continuous magnitude." All the other sciences use mathematics to express facts and generalizations with accuracy, concerning their respective magnitudes of substance and force.

Next come the three sciences dealing with matter as a whole, lifeless and living alike, and its changes. It was once considered easy to distinguish between the first of these,

2. Chemistry,

and the next,

3. Physics.

Chemistry, it was said, dealt with subdivisions of matter smaller than the molecule; physics, with larger subdivisions, or molecules and groups of molecules. But physics now includes the field of the sub-atom, which is matter in its smallest possible subdivisions, such as the electron and the proton. The old dividing line between chemistry and physics has quite broken down. The best way of distinguishing between the two is to say that chemistry deals with changes in matter which affect its composition; and that physics deals with changes in matter which do not affect its composition. This will be elaborated later.

The last of these sciences dealing with matter as a whole is

4. Astronomy,

dealing with matter in its largest aggregations, such as suns, planets, comets, and other starry phenomena. These three sciences may be placed in any order; it seems wisest to use the order approximately of increasing magnitude of the subject-matter studied.

Last come the three sciences dealing exclusively with organic or living matter. These are,

5. Biology,

or the science of living matter, including botany and zoology, the sciences of plant and animal life; as well as physiology, the science of the human body;

6. Psychology,

the science of mind; and

7. Sociology,

the science of living matter in its group relationships. This includes all sub-sciences of the group relationship, such as anthropology, archeology, law, government, philology, ethics, comparative religion, and philosophy. Expressed as a table, we now have:

TABLE OF THE SCIENCES

I. Mathematics.

II. *The sciences dealing with all matter.*

- 2. Chemistry.
- 3. Physics.
- 4. Astronomy, including geology, the science of the earth.

III. *The sciences dealing only with living matter.*

- 5. Biology.
- 6. Psychology.
- 7. Sociology.

This framework is logical, systematic, and complete. Within its three main groups (mathematics, sciences of all matter, sciences of living matter) and its seven sciences (mathematics, chemistry, physics, astronomy, biology, psychology, and sociology) all the phenomena or facts in the universe can be properly classified, and thereafter reasoned about.

1. Mathematics

THE FIELD OF MATHEMATICS

About the time that spoken language assumed a definite form, among many primitive races, how many numbers could primitive man recognize? Why do we count by tens, or use the decimal system? Which came first, writing of words or numbers? How did the Egyptians express the numbers 100,000 and 1,000,000? Where do our numbers, from 0 up to and through 9, come from? How is it possible, mathematically, to remove an object from a sealed box, without opening the box or having the object pass through any of its walls?

Such are the questions which mathematics solves for man.

The answers to these questions are: Primitive man, at the time indicated, recognized only three numbers: 1, 2, and "many." In ancient languages of widely different races we find three "numbers" in the declension of nouns and adjectives, and the conjugation of verbs: the singular, the dual, and the plural. Man today generally uses only singular and plural.

We count by tens (or, use the decimal system) because we have five fingers on each hand, or ten fingers. Counting means counting on the fingers. If we had had hands like the ai, the three-toed sloth, we would have developed a sextantal or six-integered system. If we had had hands like the hoofed (one-toed) modern horse, we would have developed a dual or two-integered system.

The use of visible signs to represent numbers and aid reckoning is not only older than writing, but older than the development of the names of the ten digits, 0 up to and through 9.

The Egyptians expressed 100,000 by a frog; 1,000,000, by a man with arms stretched out in admiration.

Our numbers or digits, 0 up to and through 9, came from the Arabs in the 12th century; the Arabs received the numbers from India, where they were first developed.

Mathematically, it is possible to remove an object from a sealed box, without opening the box or having the object pass through any of its walls, by means of the fourth dimension—a dimension additional to and outside of the three ordinary dimensions of height, length, and breadth. Practically, this is not possible.

What is mathematics? We have used the old, discarded definition of "the science of separate (discrete or distinct) and continuous magnitude." The traditional fields of mathematical thought are number and quantity. Both of these are actual things: the number of apples in a basket, the quantity of water in a bucket, may be perceived by the senses, and, after some standard of measurement is adopted, may be measured and expressed in numbers as "four apples," "three quarts of water." Even minus numbers may express actuality. A man, who has four dollars, and buys a pair of shoes for five dollars, owes one dollar after paying out all he has: mathematically, this may be expressed by saying that he owns minus one dollar. Any man or woman who faces the pile of bills at the first of the month, and ruefully contemplates the dwindling bank balance, realizes without argument the actuality of minus numbers.

So far, we have dealt only with a certain number or quantity of things, or the absence of these, expressed by a minus number. Having gotten this far, mathematicians made the bold hypothetical leap that the abstract numbers (such as one, four, fifteen, minus one) could be studied, and their activities and qualities discovered, without concrete application to any objects. Mathematicians went beyond this, and soon left reality entirely behind. The square root of a certain number means the number which, multiplied by itself, would give the certain number. Thus two is the square root of four; for two, multiplied by itself, gives four. The square root of four is a real number, two; but what about the square root of the number "minus four"? By the laws of multiplication, two times two (or, plus two times plus two) gives plus four; and minus two times minus two also gives plus four. No real number, multiplied by itself, can give minus four. Minus four can be factored (or, divided into two or more numbers which, multiplied together, give the number) into four and minus one. Then the square root of minus four, mathematicians say, is two times the square root of minus one. And this is an unreal number: there can never be a real square root of any minus number.

The numbers we have been dealing with, one, two, three, four, five, minus one, minus two, and the like, are called *cardinal numbers:* they indicate the number of individuals composing the aggregate, taken collectively. Another series, first, second, third, fourth, fifth, called *ordinal numbers,* indicates the order or position of the object in the group of objects considered from some starting point. This series brings up new problems.

The mathematical turmoil of the past hundred and fifty years led to the witty definition of Bertrand Russell,

> Mathematics is saying what we do not understand about things we cannot comprehend.

This is brilliant, although no definition.

The accepted definition today is that of Whitehead, of Cambridge University:

> Mathematics is the science concerned with the logical deduction of consequences from the general premises of all reasoning.

Psychology, criticizing logic, has established that logic does not follow reality; that reasoning is always in the end faulty; and that its general premises are worthless. Yet there is today no better definition of mathematics.

Leading divisions or sub-branches of the science of mathematics are arithmetic, algebra, and geometry, including trigonometry.

ARITHMETIC

Arithmetic is the science of dealing with numerical quantities in their numerical relations. In our arithmetic, we use the decimal system, with the digits, 0 up to and through 9, derived through the Arabs from India. The Romans also used a decimal system, with letters instead of digits. The following indicates their numeration:

Arabic	*Roman*	*Arabic*	*Roman*	*Arabic*	*Roman*
1	I	7	VII	40	XL
2	II	8	VIII	49	XLIX
3	III	9	IX or VIIII	50	L
4	IV or IIII	10	X	100	C
5	V	20	XX	500	D
6	VI	28	XXVIII	1,000	M (once written cIɔ)

The Roman symbol for 500, D, came from using the latter half of the old way of writing 1,000, where cIɔ was used instead of M. Thus the figure 1,444 would be expressed, in Roman numerals, MCDXLIV.

The duodecimal system, or system based on twelve integers, comes from the Assyrians; we use it in length (12 inches to the foot), in English and other coinage systems (12 pence to the shilling); and, as the sexagesimal system, or system based on 60 integers (12 × 5 = 60) in the divisions of time (60 seconds make a minute, 60 minutes make an hour, 24 hours make a day), and in the divisions of a circle,

60 seconds (60″) make 1 minute.
60 minutes (60′) make 1 degree.
360 degrees (360°) make up the circumference of a circle.

Places on the earth's surface are located by longitude, the distance east or west of the meridian of Greenwich, and latitude, the distance north or south of the equator, each expressed in terms of seconds, minutes, and degrees. A movement is on foot to have the French decimal system of numeration, the metric system, replace our anarchic systems of measuring length and quantity. Since our mathematics and our currency system are already decimal, this would greatly simplify practical arithmetic.

Numbers, as we have said, are divided into cardinal numbers (1, 2, 3, 4, 5) and ordinal numbers (1st, 2nd, 3rd, 4th, 5th). Arithmetic is erroneously supposed to deal exclusively with cardinal numbers; most numbers actually treated by it are ordinals. Thus page 100 on this book does not mean the page 1 × 100, but the 100th page, starting with page 1; the page after the 99th page, and before the 101st. For ordinary purposes we use the integers, 1, 2, 3, as the numbered pages of the book; the Roman numerals I, II, III for the chapter numbers; and we could use the letters a, b, c (as page 12a, 12b) to indicate pages inserted after 12 and before 13.

Cardinal numbers are usually written with the largest first, as 1,235,671; ordinal, as when we write a date, with the smallest, July 4, 1776, being written as 4.7.1776 or 4/7/1776. The year here is written partly cardinal and partly ordinal; the first three figures cardinal, the last ordinal. 1776, expressed as an ordinal would be, the 6th year of the 8th decade of the 8th century of the 2nd millennium or period of a thousand years, would be written, as an ordinal 6.8.8.2.

Thus the date, completely expressed as an ordinal, would be, 4/7/6.8.8.2. Considering the numbers 1 through 100, the first ordinal may be any number, and the subsequent numbers any numbers. Ordinarily the first ordinal is thought of as 1, and the other numbers in regular order; but, if the figures 1 through 100 are drawn out haphazard in a lottery, 13, 99, or 100 may come out as the 1st number, followed by any of the others in any order.

Ordinary mathematical symbols for integers, fractions, and decimal fractions, are well understood. The four primary arithmetical operations are,

Addition.	$20 + 4 = 24.$
Subtraction.	$20 - 4 = 16.$
Multiplication.	$20 \times 4 = 80.$
Division.	$20 \div 4 = 5.$

The symbols for these four operations, and for equality (=) are also well understood. Addition is the process of expressing the whole, parts of which have been named. Subtraction, the process of expressing the remainder, when a part is taken from the whole. Multiplication consists in treating one number as a unit, and taking it a number of times; division, in finding out how many times a number, treated as a unit, is contained in another number. The results of the four processes give a sum; a difference; a product; and a quotient. In division, there may be a remainder left undivided. Thus,

$$21 \div 4 = 5\tfrac{1}{4}, \text{ or 5 with a remainder of 1.}$$

The *powers* of a number are the number multiplied by itself. Thus, 2 to the second power equals 2×2, or 4; 2 to the 5th power, 2^5, equals $2 \times 2 \times 2 \times 2 \times 2$, or 32. The *root* of a number is that number which, multiplied by itself a certain number of times, will exactly produce the original number. Thus the square root or second root of 4 (expressed $\sqrt{4}$ or $\sqrt[2]{4}$) is 2; because 2, multiplied by itself, or taken twice, gives 4. The 5th root of 32 (expressed $\sqrt[5]{32}$) is 2. *Factors* are numbers which exactly multiply into a number; thus the factors of 60 are 12 and 5; or 6, 2, and 5; or 3, 2

2, and 5; or various other combinations. A number is a *prime* which is divisible only by itself and 1; thus 31, whose only factors are 31 and 1, is a prime.

Tests for simple divisibility are:

Any number is divisible by 1.

Any even number is divisible by 2.

Any number, the sum of which digits is divisible by 3, is divisible by 3. Thus, 111,111 (whose digits add up to 6), is divisible by 3, since 6 is divisible by 3; as are also 792,342, etc.

Any number, whose last two digits make up a number divisible by 4, is divisible by 4. This is because 100, or any number of hundreds, is divisible by 4; hence the hundreds may be disregarded, and the divisibility tested by the number composed by the last two digits.

Any number ending in 5 or 0 is divisible by 5.

Any even number, the sum of whose digits is divisible by 3, is divisible by 6. This combines the rules for 2 and 3, the factors of 6.

Any number, whose last 3 digits make up a number divisible by 8, is divisible by 8. Or, from the rule for 4, if the number of hundreds is even (since 8 divides into 200 and its multiples), and the last two digits make up a number divisible by 4, the whole is divisible by 8.

Any number, the sum of whose digits is divisible by 9, is divisible by 9. This is the rule for 3 expanded.

Any number ending in 0 is divisible by 10.

Any number, where the difference between the sum of the 1st, 3rd, 5th, and other odd digits, and the sum of the 2nd, 4th, 6th, and other even digits, is 0, or is divisible by 11, is divisible by 11.

To find whether a number is divisible by 7, 11, or 13, arrange the number in groups of three figures, beginning from the right hand end. Treat each group as a separate figure. Get the difference between the sum of the 1st, 3rd, and other odd figures, and the sum of the 2nd, 4th, and other even figures. If this difference is 0 or is divisible by 7, 11, or 13, the whole number is so divisible. Thus 129,129 (since its 2nd 3-digited figure, 129, subtracted from the 1st 3-digited figure, 129, gives zero) is divisible by 7, 11, and 13. 31,521 (521 − 31 = 490, divisible by 7 but not by 11 or 13) is divisible by 7, but not by 11 or 13.

Any even number, whose last two digits make up a number divisible by 4, and the sum of whose digits is divisible by 3, is divisible by 12. This combines the rules for 4 and 3, the factors of 12.

Similarly, a rule can be constructed for any test of divisibility.

A fraction is a submultiple, or a multiple of a submultiple, of any quantity. Thus, if 7 is the quantity, $\frac{1}{7}$ and $\frac{4}{7}$ are respectively submultiples and multiples of a submultiple of 7. To add or subtract fractions, reduce to a lowest common denominator, and add or subtract the numerators. To multiply fractions, multiply the numerators together, and the denominators together; the fractional product, when simplified by dividing both numerator and denominator by the same common factors, is the product. To divide fractions, invert the divisor, the fraction by which the first fraction, or dividend, is to be divided, and proceed as in multiplication of fractions. Decimal fractions, as the following:

One-tenth	.1
Seven hundred forty-seven one-thousandths	.747

may be added, subtracted, multiplied, or divided as if they were whole numbers, taking care to place the decimal point at the right place.

Among other matters treated in arithmetic are percentage, approximations, logarithms, and surds. Among the curiosities of mathematics are the immense sums which compound interest generates. Over small periods, this does not differ greatly from ordinary interest. Thus the interest on $1,000, invested at 6%, at simple annual interest, gives $1,060 at the end of the year; and, if the interest is compounded every instant or second, the result is only $1,061.84. But over longer periods, the amount multiplies unbelievably. In 1922 a California judge rendered judgment on a loan of $100, made in 1897, with interest at 10% monthly, compounded monthly. The amount of the judgment, which required a staff of clerks several days to compute, was the immense sum of $304,840,332,912,685.16—all out of a $100 note in 25 years! Needless to say, the judgment was not collected. One dollar, placed at simple interest at the time of the birth of Christ, at 4%, would amount to merely $78.24; compounded annually, the amount would be, in round numbers, $600,000,000,000,000,000,000,000,000,000,000!

Interesting rules can be worked out, as these in multiplication:

> Where the sum of the two numbers to be multiplied is an even number, the highest product is the product of the two halves of the even sum. The product of the next most nearly equal numbers which give the even sum is less than the highest product by 1; the product of the next pair is less than this by 3; the next, by 5; and so on down through the odd numbers. Thus, the sum of 17 and 3, which are to be multiplied, is 20. The products of numbers whose sum equals 20 are:
>
> $10 \times 10 = 100$,
> $11 \times 9 = 99$ (1 less),
> $12 \times 8 = 96$ (3 less),
> $13 \times 7 = 91$ (5 less),
> $14 \times 6 = 84$ (7 less),
>
> and so on down.

> Where the sum of the two numbers to be multiplied together is odd, the highest product is that of the most nearly equal numbers, whose sum is the odd number; the products below regularly decreasing by 2, 4, 6, and the other even numbers. Thus, when 6 and 25 are to be multiplied, their sum being 31, an odd number, the products of numbers whose sum equals 31 are,
>
> $15 \times 16 = 240$,
> $17 \times 14 = 238$ (2 less),
> $18 \times 13 = 234$ (4 less),
> $19 \times 12 = 228$ (6 less),
>
> and so on down.

When we come to consider powers, here are some simple questions with their answers.

What whole numbers, below 11, raised to any power, have products ending in the original digit? Answer: 1, 5, 6, and 10.

What whole numbers below 11 have all their higher powers end in the even digits 2, 4, 6, 8; and what whole numbers in the odd digits, 1, 3, 7, 9? Answers: 2 and 8; 3 and 7.

What two whole numbers below 11 have all their higher powers end in only two digits; and what are these digits? Answers: 4, whose higher powers end in 4 and 6; and 9, whose higher powers end in 9 and 1.

ALGEBRA

The word algebra is derived from the Arabic *al-jebr wa'l-muqabala,* meaning the transposition and removal (of the terms of an equation). This is a sub-branch of mathematics which may be defined as the generalization and extension of arithmetic. Simple algebraic problems have been found in the Ahmes papyrus, an Egyptian writing dating to the 18th century B.C., or earlier. India and Arabia are entitled to the chief credit for its development. Commencing simply as a method of solving equations involving unknown numbers, designated a and b, we have these two equations given:

$$(1)\ a + b = 7.$$
$$(2)\ a - b = 1.$$

By adding these, we get

$$(3)\ 2a = 8.$$

We arrive at the value of a by dividing (3) by 2, giving

$$(4)\ a = 4.$$

It is now easy, by substituting this value for a in (1) or (2), to arrive at,

$$(5)\ b = 3.$$

This is the simplest form of problem, and its solution. Since the time of the philosopher Descartes, algebra has grown highly complicated.

Graphic representation is introduced into algebra, both covering such simple graphs as the number of scholars present in a class for each day of the month, and the thermometric readings on successive days; and for such complicated values as the successive values of an algebraic function.

A *monomial* is an algebraic phrase requiring simple multiplication, as the following, where the period (.) stands for the multiplication sign:

$$a.2.a.a.b.c.3.a.a.c.$$

This monomial, multiplied out, would give $6a^5bc^2$. A *multinomial* is an algebraic phrase signifying that two or more monomials are to be added or subtracted, as in either of the following cases:

$$6a^5bc - 4ab^2c.$$
$$6a^5bc + 4ab^2c.$$

Where two different multinomials are given, this makes a *binomial;* if the value of each is given with the sign of equality (=), this makes a binomial equation. Where three different multinomials are given, this makes a *trinomial.* Complicated methods and formulae have been worked out for solving binomial and trinomial equations. It is not necessary to go further into this sub-science, since enough has been said to direct the interested reader to textbooks and treatises on algebra, if further investigation is required.

GEOMETRY

Geometry means, literally, "earth-measuring"; it deals with the study of the properties of space. It arose in Egypt, from the need of surveying the lands inundated by the Nile floods. Here it was confined to simple rules for measuring triangles, or 3-sided figures, and quadrilaterals, or 4-sided figures; the four 3-dimensional geometrical entities of point, line, surface, and solid, being discussed only insofar as they referred to practical measurements. The most celebrated geometrician of classical thought was the Greek, Euclid; ordinary three-dimensional geometry is called Euclidean after him. According to Euclid, A *point* is that which has no parts, or which has no magnitude. It may be defined as the intersection between two lines.

A *line* is length without breadth. It may be defined as the intersection between two plane surfaces.

A *surface* is that which has only length and breadth. It may be defined as the intersection between two three-dimensional solids.

A *solid* is that which has length, breadth, and thickness. By analogy, it may be defined as the intersection between two four-dimensional bodies.

It must be emphasized that none of the first three of these, point, line, or surface, has real existence, in the eyes of Euclidean geometricians. A dot made on this sheet, to represent a point, has, as a microscope reveals, length, breadth, and some thickness. A line, as the microscope also shows, has also some thickness. If point, line, or surface are to be what geometricians intend, they are purely imaginary and arbitrary tools of thought, imaginary simplifications or abstractions of reality, like the color of an object. The object (our senses tell us) exists; we can mentally extract its color from it, and speak of the color apart from the object, but the color does not exist apart from the object, whether that object be some substance or a ray of light. Neither does a point, line, or surface actually exist. According to non-Euclidean geometricians, a 3-dimensional solid is as non-existent.

If we allow motion in geometry, we can generate these entities thus:

The path of a moving point is a line.
The path of a moving line is a surface.
The path of a moving surface is a solid.
The path of a moving solid is—

Ah, there we touch on fourth dimensional geometry, which we will reach soon enough.

The actual axioms or postulates of Euclid, or statements held to need no proof, are the following:

1. Straight lines exist which have the property that any one of them may be produced both ways without limit, that through any two points in space such a line may be drawn,

and that any two of them coincide throughout their indefinite extensions as soon as two points in the one coincide with two points in the other.

2. Plane surfaces or planes exist having the property laid down in Euclid's Definition 7, that every straight line joining any two points in such a surface lies altogether in it.

3. Right angles, as defined in Euclid's 10th Definition, are possible, and that all right angles are equal; that is to say, whenever in space we take a plane, and wherever in that plane we construct a right angle, all angles thus constructed will be equal, so that any one of them may be made to coincide with any other.

4. If a straight line meet two straight lines, so as to make the interior angles on the same side of it taken together less than two right angles, these straight lines, being continually produced, shall at length meet on that side on which are the angles which are less than two right angles. This is the notorious stumbling-block in the Euclidean geometry. It may be worded more comprehensibly. In a plane it is possible to have two straight lines which are parallel; that is, which never meet, no matter how far they are extended.

5. Figures may be moved freely in space without change of shape or size.

6. In any plane a circle may be described, having any point in that plane as a center, and its distance from any other point in that plane as a radius.

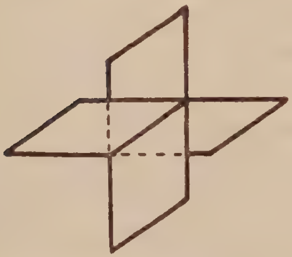
The fourth of these is true only as applied to a plane surface; and a plane is only one among an infinitude of surfaces. For instance, if we take a spherical surface, the proposition is not true, if by straight line we mean the shortest line joining two points on the sphere. Such a shortest line on the spherical surface must be the arc of a great circle, that is, a circle exactly dividing the sphere into halves; for all arcs of great circles, when extended, meet; hence no two of them can be parallel. There are thus no parallel lines on a sphere; as there are none on many other surfaces.

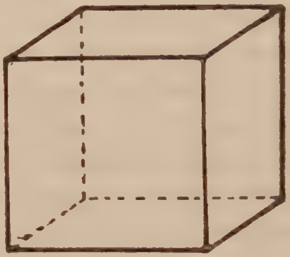
Euclid's celebrated proposition, "The sum of the interior angles of a triangle is always equal to two right angles," is likewise untrue of a spherical surface. The sum of the interior angles of a spherical triangle is always greater than two right angles, and increases with the area of the triangle.

Higher branches of geometry include

Projective geometry, which expands Euclidean geometry into an inclusion of geometrical continuity, that is, of points and lines at infinity.

Descriptive geometry, the method of illustrating solids, or 3-dimensional figures, upon a plane surface, as upon the surface of this page of this book. The following two figures, one of two planes intersecting another at right angles, the second of a cube, illustrate this:





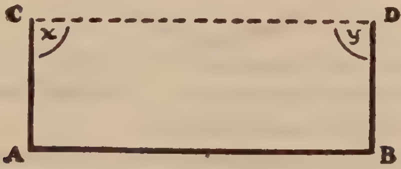
Analytical geometry, the representation of geometrical figures and their relations by algebraic equations.

Line geometry, an analytical treatment of the line regarded as the space element, instead of the point; and the recent all-important

NON-EUCLIDEAN GEOMETRY

It was from attempts to improve Euclid's axiom concerning parallel lines, that non-Euclidean geometry arose. Conservative geometricians often define this as "geometries other than that of the space of experience"; the researches of Einstein and others, in physics, tend to the belief that the actual geometry of the space of experience is non-Euclidean. We shall take up the evidence for this when we reach astrophysics, under astronomy.

The great mathematicians Gauss, Lobatchewsky, Bolyai, and Reimann showed that three other geometries are possible, all existing without the assumption that there can be parallel straight lines which do not meet. These intricate geometries were of course mathematical theorizing; and, until the publication of Reimann's work in 1867, the world of thought did not waken to the overturn of classical geometry that was taking place. Three of these geometries are based on the following. From a straight line, AB, equal perpendiculars, AC, BD, are drawn. Then C and D are joined. It is shown that the angles ACD, BDC (marked x and y) are equal.



Then the three hypotheses are:

1. That these angles are both right angles.
2. That these angles are more than right angles.
3. That these angles are less than right angles.

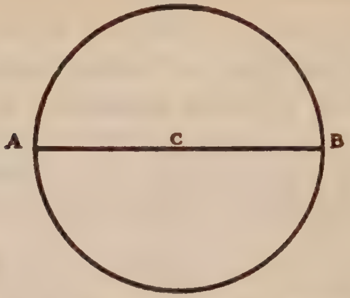
Only the first of these three, of course, is Euclidean. The final proofs as to which of these geometries fits our space can only be established factually by measurement. But, as scientists point out, while it may be possible to prove that non-Euclidean geometry is true, it will never be possible to prove that Euclidean geometry is true. The two angles ACD, BDC, may be measured and discovered to be less or more than two right angles, definitely; but, since the most exact measurements are subject to slight errors, no measurement will ever establish that they are exact right angles.

Einstein's proof in physics establishes that the geometry based on (1) does not apply to our spacial universe.

Trigonometry is that branch of mathematics dealing with the measurement of plane and spherical triangles. It is really a branch of geometry.

Among the classic problems of mathematics, still unsolved, three stand out. These are:

(1) The squaring of the circle. Being given a circle of known diameter, AB, or radius, AC, we wish to learn the length of its circumference.



The ratio of circumference to diameter is designated by the Greek letter π (pi). The mathematical value of π to 200 decimal places is:

3.14159 26535 89793 23846 26433 83279 50288 41971
69399 37510 58209 74944 59230 78164 06286 20899
86280 34825 34211 70679 82148 08651 32823 06647
09384 46095 50582 23172 53594 08128 48111 74502
84102 70193 85211 05559 64462 29489 54930 38196 plus

Before me are fuller figures, giving the value of π to 707 decimal places. For ordinary calculations, π is taken to be 3.1416, or 22/7 (twenty-two sevenths.) But, since the exact value can never be ascertained, since the decimal fraction extends infinitely, the exact length of the circumference of a circle, whose radius or diameter is known, can never be accurately ascertained.

(2) The duplication of the cube. We are required to construct, by means of ruler and compass alone, the edge of a cube whose volume is twice that of a given cube. That is, if we are given a cube of side a, we require x, the side of a second cube, such that $x^3 = 2a^3$; if a equals 1, then our equation is, $x^3 = 2(1^3)$ or 2. This cannot be solved, without more elaborate instruments.

(3) The trisection of an angle, or dividing any angle (except a special case like an angle of 180° or 90°), into three equal parts, by ruler and compass alone.

THE FOURTH DIMENSION

A brief introduction to fourth dimensional mathematics, and we are through. The fourth and higher dimensions are realities, in mathematical *extension;* and are commonly regarded as unrealities, in dimensional *construction.* In arithmetic or algebra, any number or letter representing a number may be raised to any power. Thus 1, raised to any power (that is, multiplied by itself any number of times), is always equal to 1: and this is, in extension, a reality. Thus 2, raised to the first five powers, gives: two to the first power, 2; 2 squared, 4; 2 cubed, 8; 2 to the fourth power, 16; 2 to the fifth power, 32. These are, in extension, realities. That is, assuming the unit to be one inch, real lines can be drawn representing 2 to the first five powers, or 2, 4, 8, 16, and 32 inches long. The same is true if, instead of 1, 2, or some other number, a letter, a or x, representing some number, is raised correspondingly to higher powers.

If we desire, however, to construct these higher powers by dimensional construction, we soon get into difficulties. 2 raised to the first power, or 2, gives us a line two inches long. 2 raised to the second power, or 4, gives us a square 2 inches wide—a plane surface composed of four square inches. 2 raised to the third power, or 8, gives us a cube. Each of its six sides is a square 2 inches wide; it contains altogether eight cubic inches. 2 raised to the fourth power, or 16, gives us—

Here we must stop. What we need is a solid of four dimensions, each of whose sides is composed of a *cube* similar to our third construction, that is, having six sides, each a square composed of four square inches. Altogether, our four-dimensional solid will contain 32 such cubes. We can not construct this out of wood, or any other solid; for our eyesight, as a rule, stops at three dimensions. Mathematicians, who deal in the fourth dimension, admit that it can not be constructed in its solid form; but they can symbolize it, and study its qualities. Such a four-dimensional figure, with each of its sides a cube, is called a *tesseract.* Drawings of the tesseract are not clear; they resemble seventeen maps of the successive partitions of Poland scrambled upon each other. Yet we can visualize some of the qualities of the four-dimensional figure, and the world it represents.

Let us start with a 1-dimensional world. Let the outside edge of this page, from top to bottom, represent a straight line, of infinite extent up and down; let this be our imaginary 1-dimensional world. Let this line be inhabited by an imaginary 1-dimensional being: smaller than the little midge which your thumb might kill on this page. Such a 1-dimensional creature would know only two directions, up the line along the page's rim, and down the same line. It could never know left and right, across the page or in the space beyond the edge of the page; nor could it know anything off the sheet's surface. Now imagine a tiny object on the 1-dimensional world, between the 1-dimensional being and the top of the page. Clearly, this object could not be passed by our little being; he knows no way to go around it. In a 1-dimensional world there is no going around. But a creature living in a world of two or more dimensions, for instance, one that inhabited the entire surface of this page, could move the object off the 1-dimensional line that constituted the 1-dimensional world, and bring it below our tiny being. This would be, to our tiny being, a miracle. The tiny object could either be moved bodily around the tiny being; or it could be rotated on the sheet's surface, so that its former top would become its bottom. This would be even more of a miracle.

Let us take a 2-dimensional world, as this page. On it, let us imagine a 2-dimensional dweller, a tiny midge who could roam at will over the surface of the page; who knew up and down, and right and left, upon the page; but who did not know anything off the page. Let this letter, Q, represent a room or enclosed space on the page. Our little 2-dimensional dweller can never enter this room or enclosed space. But a dweller in a 3-dimensional world could lift the being off the page entirely, and replace him within the center of the room represented by Q; or, if the being were imprisoned in the Q, he could lift the being off the page entirely, and replace him outside of the room. These would be miracles to the 2-dimensional dweller; since what is to him a sealed room has been entered and left, without passing through any of the walls of the room.

Take the letter L on this page. The 2-dimensional being would understand that this letter could be rotated, so that it could assume any of these positions on the pages: ┘, ⅂, ┌. But, to him, it could never be rotated so that it would appear reversed, as if seen in a mirror, thus: ⅃. Yet a 3-dimensional being could simply rotate the L in the 3-dimensional space off the page, and lay it down in the reversed or mirrored position, ⅃: which would be a further miracle to the dweller in the 2-dimensional world.

Now, by the same analogy, instead of the 2-dimensional dweller, take yourself, the reader of this book, dwelling in our world, which is called 3-dimensional. Let the world in which you live be substituted for the 2-dimensional surface of this page. For the room represented by the letter Q, substitute the room in which you are sitting; for the letter L, which was reversed, substitute any 3-dimensional object, as a stoppered bottle, or the room itself. Could an object within this room, such as the book you are reading, be removed outside of the room, without passing through any of its six walls (four walls, floor, and ceiling)? Could the room itself or the stoppered bottle be entered, reversed, or turned inside out, or otherwise treated as the letter L could be treated?

To you, the reader of this book, this is physically impossible. It would be a miracle, and more. Yet, to a dweller in the 4-dimensional world you are imagining, or some higher dimension, it would be easy to reach inside of the room, not through any of its 3-dimensional walls, but, ignoring these walls as we ignored the walls of the letter Q, through the fourth dimension; and the object, this book, could then be easily removed outside of the sealed room, without passing through any of its walls. Similarly, just as the letter L was rotated *outside* of its 2 dimensions, and reversed, just so could this room, by a 4-dimensional being, be rotated *outside* of its three dimensions entirely, and reversed, turned inside out, or treated in any way a 4-dimensional dweller desired.

And, increasingly so, with 5th, 6th, and higher dimensional dwellers and worlds.

We will postpone the fascinating effort to visualize this

4-dimensional world, until we reach Book VI: *The Outline of Philosophy.*

We have merely indicated the broad trends of mathematics in this outline; and, it must be confessed, man as scientist has only scratched the surface of the possible studies of the qualities and attributes of number, its symbols, and magnitudes. Such a vigorous piece of thinking as Keyser's *Mathematical Philosophy* is ruined, for the scientific mind, by the author's dominant insistence upon invariants—things eternally and immutably true, man's "quest for abiding reality." There are, scientifically, no invariants known to man, whose knowledge comes only through his limited senses; and the hypothesis that there are unattainable invariants entirely outside of man's experience, to be understood and described somehow by him, is worthless, as well as unsupported.

Keyser is more valuable, in his study of infinities. Yet modern mathematics is still floundering a trifle in this matter. Infinity may be defined, subjectively, as that power of the human mind, by means of which, at the most distant length of extension or enumeration thought of, the mind is capable of further extension and enumeration. Many mathematicians hold that infinity is always equal to infinity; others correct this view. For instance, there is an infinite number of points in a line 1 inch long. There is also an infinite number of points in a line 2 inches long. These two infinities, it is urged, are not only not equal, but the second is exactly twice the first. Progress is being made in this field; new conceptions and a new nomenclature may be invented at any time.

This discussion of mathematics may be closed with an ancient problem, into whose solution infinity enters: the mathematical proof that 2 is equal to 1. Here are the opening equations:

$$(1)\ 2 \times 0 = 0.$$
$$(2)\ 1 \times 0 = 0.$$

Since things equal to the same thing are equal to each other, we get:

$$(3)\ 2 \times 0 = 1 \times 0.$$

Dividing through both sides of the equation by 0, we get:

$$(4)\ 2 = 1.$$

Of course, this holds a fallacy. The error lies in the step leading to (4). Dividing through by 0 always gives infinity; just as dividing by infinity gives zero. Thus the final step, (4) should appear:

$$(4)\ \text{Infinity} = \text{infinity},$$

which is held to be mathematically true.

ADDITIONAL READINGS

On the various branches of mathematics, any accepted high school or college text-book gives full elementary treatment.

On mathematical philosophy, the writings of Bertrand Russell on the subject, and *Mathematical Philosophy*, by Cassius J. Keyser, are valuable.

FOURTH DIMENSION. *A Primer of Higher Space,* by Claude Bragdon (New York, 1923), contains an elementary treatment of the subject.

II. The Sciences Dealing with All Matter

2. Chemistry

THE UNIVERSE OF THE ATOM

Chemistry is commonly defined as the science which studies the composition of substances, or matter in its smallest subdivisions. Chemistry deals with the atom, its properties, behavior, and constituents; physics deals with changes which do not affect the composition of the molecules of matter. We will find out soon what molecules and atoms are. Physics studies the density, elasticity, hardness, electrical and heat conductivity, heat expansion, and similar manifestations, of a substance; the chemist studies changes in substance, effected by mixture, electricity, heat, and other causes. To the physicist, matter has three forms: solids, liquids, and gases; to the chemist, only two: compounds, which admit of analysis into simpler substances, and of combination from simpler substances; and elements, which do not admit of analysis.

A *molecule* is the smallest division of a substance, where any further division would cause it to cease to be the substance. Thus a piece of rock salt can be broken up repeatedly, and powdered to the utmost fineness, yet each fragment will remain salt. When we reach portions so small that any further division will cause the fragments to cease being salt, we have reached the molecules of salt. The size of a molecule can be grasped from this statement of comparative sizes. If a single drop of water were magnified until it reached the size of the earth, each molecule in it would be the size of a baseball. The speed of hydrogen molecules is about 60 miles a minute, or 300 times the speed of a running man, and about fifteen times the speed of the fastest airplane.

An *atom* is the unit which goes to make up the molecule. If the molecule contains only one kind of atom, the substance is defined as a chemical *element*. As a correction to this, it must be remembered that chemists have already observed at least two elements, uranium and thorium, giving rise to elements different from themselves. Where the atoms within a molecule differ, the substance is in general called a chemical *compound.*

It was once believed that the eighty or more elements had distinct and unique atoms, incapable of being broken up into any more basic substance. This is no longer held. The atoms of all matter consist of particles of positive and negative electricity. The hydrogen atom, the simplest of all, consists of a unit of negative electricity, the *electron,* revolving around a nucleus of positive electricity, the *proton.* The mass or inertia of the electron is only 1/1845th of the lightest known atom, that of hydrogen. In other words, the weight of the electron, as compared with that of the proton, is almost negligible.

An atom, says Millikan, consists of a heavy core or nucleus of one or more free protons, about which are grouped enough electrons to render the atom stable, or neutral. Since the hydrogen atom is the lightest, the atomic weight of other elements is the expression of their weight compared to that of the hydrogen atom. The *atomic number* of hydrogen is 1. Its nucleus contains one proton; outside the nucleus is one electron, to neutralize the proton. The result is a system, the atom of hydrogen. The heaviest known element is uranium: its atomic weight is 238, its atomic number 92. Its nucleus therefore contains 92 protons, and, in addition, 146 more protons, to make up its weight; as well as 146 electrons, to neutralize these 146 protons. Around the nucleus are 92 additional electrons, to neutralize the 92 protons constituting the atomic number. The result is a system, the atom of uranium. Remove one proton from the nucleus, and it is no longer an atom of uranium. Remove 10 protons, and you have an atom of lead; 13, of gold; and 91, of hydrogen. Theoretically, at least, all elements are transmutable into other elements by this process.

Magnify the nucleus of an atom 1,000,000,000 times, and it is still too small to be seen in the most high-powered microscope. Magnify it 10,000,000,000 times; the outer electrons are now 3 feet from the nucleus, but the nucleus itself is still smaller than a pin-point. The nucleus, then, is less than 1/10,000th the diameter of the atom; and yet it may contain 384 protons and electrons combined, as does the nucleus of the atom of uranium. Atoms themselves, then, are not solids, but mainly holes, or vacancy.

Matter, then, is divisible into molecules; these, into atoms; these, into protons and electrons. The atomic system is largely vacancy; what occupies it, proton and electron, is electric charges. All matter, then, is merely a form of energy. There is no ultimate solidity or substance to anything: *all that exists is energy.*

This should be emphasized. Everything that exists or has ever existed is merely energy. This sheet of paper, rocks, trees, animals, the great pyramids of Egypt, Abraham Lincoln, the neolithic man, his polished stone weapons, the animals he slew, and the ground he raced along, are all composed of the one thing: energy. Light, electricity, and heat, are composed of the same thing. The universe consists of emptiness, charged with electrical energy. Was this created, or has it always existed? One theory is as strong as the other; in fact, the idea of creation requires stronger proof than the idea that energy has always existed. There is no scientific data of any kind as to how energy began; it is probably permanently unknowable. This is one of the insoluble riddles of the universe.

THE CHEMICAL ELEMENTS

The laws of chemical combination are two:

1. A chemical compound always contains the same constituents, in the same proportion by weight.
2. If two elements form several compounds with each other, the different masses of the second which combine with a fixed mass of the first bear a simple ratio to one another.

Dalton discovered this by studying such substances as olefiant gas and marsh gas, each composed of carbon and hydrogen. Their composition is,

Olefiant gas, 85.7 carbon and 14.3 hydrogen.
Marsh gas, 75.0 carbon and 25.0 hydrogen.

On comparing these numbers, he discovered that the ratio of carbon to hydrogen in olefiant gas is 6 to 1; in marsh gas, 3 to 1, or 6 to 2. Similar ratios found in other compounds gave rise to the rule, or generalization, stated second above.

Of the 80 and more elements known, only a few enter largely into substances. The solid crust of the earth is made up mainly of eight elements, in the proportions given:

ELEMENTS IN THE EARTH'S CRUST

Oxygen	47.29%	Calcium	3.77%
Silicon	27.21%	Magnesium	2.67%
Aluminum	7.81%	Potassium	2.40%
Iron	5.46%	Sodium	2.36%

These comprise 98.97% of the earth's crust. The element oxygen also forms 8/9ths of water, and about 1/5th of air, nitrogen being most of the remaining 4/5ths. Carbon is the principal element that enters into the structure of living things, with hydrogen, oxygen, and nitrogen always present. Protoplasm, of which all life is made, is composed of:

ELEMENTS IN LIVING PROTOPLASM

Oxygen	72.0%	Hydrogen	9.1%
Carbon	13.5%	Nitrogen	2.5%

Sulphur, phosphorus, chlorine, sodium, potassium, calcium, magnesium, iron, and silicon, together less than 3%.
Fluorine, iodine, and manganese, a small trace.

And that is what life consists of, chemically: that is what little boys and girls are made out of. Man, in spite of ancient legends, is not made of the dust of the field: he is made of chemical matter in the higher form of colloids, a substance akin to glue. Allan Craig points out that the body of an average man weighing 150 pounds contains, chemically,

> Lime enough to whitewash a fair-sized chicken-coop, sugar enough to fill a small shaker, iron to make a tenpenny nail, plus water. The total value of these ingredients, commercially, is 98 cents, or about 60 cents per hundredweight for man on the hoof.

Any extended study of chemistry contains a table of the names, symbols, and atomic weights of the elements. In the list below, the names of the rarer elements are printed in *italics.*

THE CHEMICAL ELEMENTS

Element	Symbol	Atomic weight	Element	Symbol	Atomic weight
Aluminium	Al	27.1	*Neodymium*	Nd	143.6
Antimony	Sb	120.2	*Neon*	Ne	20
Argon	A	39.9	Nickel	Ni	58.7
Arsenic	As	75	Nitrogen	N	14.04
Barium	Ba	137.4	*Osmium*	Os	191
Bismuth	Bi	208.5	Oxygen	O	16
Boron	B	11	Palladium	Pd	106.5
Bromine	Br	79.96	Phosphorus	P	31
Cadmium	Cd	112.4	Platinum	Pt	194.8
Caesium	Cs	132.9	Potassium	K	39.15
Calcium	Ca	40.1	*Praseodymium*	Pr	140.5
Carbon	C	12	Radium	Ra	225
Cerium	Ce	140.25	*Rhodium*	Rh	103
Chlorine	Cl	35.45	*Rubidium*	Rb	85.5
Chromium	Cr	52.1	*Ruthenium*	Ru	101.7
Cobalt	Co	59	*Samarium*	Sm	150.3
Columbium	Cb	94	*Scandium*	Sc	44.1
Copper	Cu	63.6	*Selenium*	Se	79.2
Erbium	E	166	Silicon	Si	28.4
Fluorine	F	19	Silver	Ag	107.93
Gadolinium	Gd	156	Sodium	Na	23.05
Gallium	Ga	70	Strontium	Sr	87.6
Germanium	Ge	72.5	Sulphur	S	32.06
Glucinum	Gl	9.1	*Tantalum*	Ta	183
Gold	Au	197.2	*Tellurium*	Te	127.6
Helium	He	4	Terbium	Tb	160
Hydrogen	H	1.008	*Thallium*	Tl	204.1
Indium	In	115	*Thorium*	Th	232.5
Iron	Fe	55.9	Titanium	Ti	48.1
Krypton	Kr	81.8	Tungsten	W	184
Lanthanum	La	138.9	Uranium	U	238.5
Lead	Pb	206.9	Vanadium	V	51.2
Lithium	Li	7.03	*Xenon*	X	128
Magnesium	Mg	24.36	*Ytterbium*	Yb	173
Manganese	Mn	55	*Yttrium*	Y	89
Mercury	Hg	200	Zinc	Zn	65.4
Molybdenum	Mo	96	Zirconium	Zr	90.6

Twenty of these, including hydrogen, oxygen, sulphur, nitrogen, carbon, silicon, and helium, are classed as non-metals; the rest as metals. All the metals except mercury are solids at ordinary temperatures; mercury is a liquid. Ten of the twenty non-metals are gases, bromine is a liquid, and the rest are solids.

CHEMICAL COMPOUNDS

Chemical affinity is the name of the quality of certain elements, by which they enter readily into combinations with each other, thereby engendering a large amount of heat in combining.

Various atoms differ among themselves in the number of atoms of other elements which they are able to hold in combination. The word used to designate that property of an element that determines the number of atoms of other elements that its atom can hold in combination, is *valence.* The hydrogen atom is one of the simplest: it never combines with more than one atom of another element. Picture to yourself the hydrogen atom as a round body with only one arm. This arm is stretched out to grasp some other atom; it can never grasp two atoms. Chlorine, iodine, and sodium, which combine with hydrogen atom to atom, are also atomic bodies with only one arm each. Such substances are called *univalent;* their valence is 1.

Elements, such as oxygen, sulphur, and calcium, where one element combines with two atoms of hydrogen or another univalent element, are said to be *bivalent.* You can picture them to yourself as round bodies, each with two arms stretched out. Each arm can grasp a univalent atom. Water is composed of two atoms of hydrogen to one of oxygen: you can picture it to yourself as a two-armed oxygen atom in the center, with a hydrogen atom swinging on by its one arm to each side. Many chemical compounds are classified by types. Thus alcohol is said to be a compound formed upon the water type: a group of two carbon atoms and five hydrogen atoms, closely linked together, taking the place of one of the hydrogen atoms. In the case of alcohol, the two-armed oxygen atom is still in the center, with a one-armed hydrogen atom clinging to one side, and the group represented by two carbon and five hydrogen atoms holding on to the other arm.

Chemists have their own scientific shorthand to express these compounds. As an example of a compound formed by univalent elements, we may take hydrochloric acid, formed of one atom each of hydrogen and chlorine. As examples of compounds formed by the bivalent element oxygen we will take water, and alcohol, formed upon the water type. You can identify the symbols from the table of chemical elements. These three compounds would then be written,

Hydrochloric acid, HCl (read "H Cl").
Water, H_2O (read "H two O").
Alcohol, H_6C_2O (read "H six C two O").

From the standpoint of their construction, according to the laws of valence, these would be diagrammed as follows:

Hydrochloric acid, $H\text{-}Cl$.
Water, $H\text{-}O\text{-}H$.
Alcohol, $H\text{-}O\text{-}C_2H_5$.

Do not forget to picture to yourself, in such diagrams, the round, one-armed atomic bodies of univalent atoms like hydrogen and chlorine; and the two-armed atomic bodies of bivalent atoms like oxygen, sulphur, and calcium.

Nitrogen is *trivalent;* its atomic body has three arms, each of which can hold hands chemically with a univalent hydrogen atom. Thus ammonia is composed of one nitrogen atom and three hydrogen atoms. It is ordinarily written H_3N; you can draw its structural diagram or formula for yourself. Carbon is *quadrivalent,* or a four-armed atomic body. No element is known whose valence exceeds 8. Today the conception of valency has lost much of its rigidity; such an element as carbon, for instance, is believed to be quadrivalent in some compounds, trivalent in others, and bivalent in still others. The general law of the nature of valency has not yet been satisfactorily phrased.

Inorganic chemistry is concerned with the descriptive study of the elements, and their compounds, except those of carbon. It deals with chemistry below the stage of life. *Organic chemistry* deals with substances occurring in the vegetable and animal organisms. *Electrolysis* is the decomposition of chemical compounds by electricity. When an electric current is passed through water, the water decomposes into hydrogen and oxygen, bubbles of each collecting at the two poles. The travelling atoms, or groups of atoms, are called *ions,* from a Greek word meaning traveller.

An *acid* is a chemical substance containing hydrogen, which it easily exchanges for a metal, when treated with a metal itself or with a compound of a metal, called a base. A *base* is a substance containing a metal combined with hydrogen and oxygen (hydroxyl). It exchanges easily its metal for hydrogen, when treated with an acid. This process is called neutralization. The products of the action of an acid on a base are, first, water, and, second, a neutral substance called a *salt.* A typical example of this important process occurs when hydrochloric acid is neutralized with sodium hydroxide (a compound consisting of one atom each of sodium, oxygen, and hydrogen). The result of the neutralization is the formation of sodium chloride, or common salt, and water. Much of your understanding of the romance of the chemistry of everyday things commences when you are able to read with understanding the chemical symbols for such a process. Here is the complete equation for the process, an equation easily understandable:

Hydrochloric acid and sodium hydroxide give common salt and water.

$$HCl + NaOH = NaCl + H_2O$$

This reaction is typical of all reactions between acids and bases. A *metal* may now be defined as a base-forming element, an element which unites with hydrogen and oxygen to form a base, or a product which has power to neutralize acids.

Chemistry, as ordinarily treated, consists in the study of the various elements; the forms in which the elements occur in nature; the various combinations into which they enter; and the properties of these elements and combinations. Man, as in all of the sciences, has learned these facts slowly; an immense volume could be written upon the facts concerning any one element; and some, like carbon, of which more than

100,000 compounds are known, would require many volumes for a detailed study of all the possible combinations discovered. We are now dealing, not with abstract ideas, as in mathematics, but with the definite qualities of objects actually found in nature.

THE TRANSMUTATION OF ELEMENTS

Throughout the Middle Ages, the chemists or alchemists spent much of their energy looking for the "Philosopher's Stone," which they believed would transmute or change base metals, such as lead, into gold. Some of these alchemists believed that they had discovered certain transmutations. For example, a knife-blade placed in a solution of sulphate of copper (blue vitriol) comes out like copper, and is indeed coated with copper, while an equivalent amount of the iron has passed into the solution. To the alchemists, this proved that the iron had been transmuted into copper. When chemistry began to be a science, the transmutation of elements was for a long time laughed at: elements were believed to be permanently unchangeable.

It is now known that uranium may in part change into radium and other elements—a spontaneous change, with the uranium atom partially disintegrating, leading to the formation of minute quantities of radium, perhaps with ionium as an intervening link. Another radio-element, thorium, at a slower rate evolves small quantities of radium. These two elements, uranium and thorium, also give off small particles of helium, an element first discovered in the sun, and only found on earth in the two radio-elements named. In the end, the final product is lead; and, since the rate of transmutation is known, this change gives a definite geological clock, or measure of geological time.

Soddy explains that, in a uranium mineral, each 1% of lead, compared to the quantity of uranium, indicates a lapse of 80,000,000 years. Every cubic centimeter by volume of helium, in a gram of uranium in a uranium mineral, indicates a lapse of 9,000,000 years. Since some helium may have escaped, and since it, forming no compounds, cannot have been originally present, this rate gives the minimum age of the rocks examined; whereas the age by the lead test, since some lead may have been in the mineral originally, gives a maximum age, which may be too great. By this test, the Carboniferous rocks are 350,000,000 years old, and the oldest Archaean rocks are older than 1,500,000,000 years.

Carbon atoms have a remarkable power of building up single molecules containing very large numbers of atoms; and such molecules form the basis for framing the structures of living organisms. As Moore points out, all life on earth depends on two factors:

1. The presence of a mere trace of carbon-dioxide gas in the air, lying at the level of only between 3 and 4 parts per 10,000 parts; and
2. The natural power of the carbon atom, contained in the carbon-dioxide, of entering into energy relationships with fellow carbon atoms.

This gave the energy; and when a suitable transformer for the energy developed, capable of turning it into the chemical energy of carbon compounds, all the complex constituents which form the basis of life might and did arise.

We shall learn, under the study of biology, that this energy transformer is the green plant-cell, utilizing the chlorophyll or green coloring matter which it contains. Carbon, in its pure or uncombined state, is found in nature in several forms: the brilliant crystalline form known as the diamond; the duller crystalline form known as graphite or black lead, forming the lead of lead-pencils; and also in the different varieties of coal. Diamonds may be manufactured artificially, by using enormous heat and pressure upon carbon; but the products are small and unsatisfactory. The forces of nature—volcano, earth heat, the vast pressure of earthquakes—form a vaster and more powerful laboratory than man has yet been able to construct. The contrary progress to manufacturing diamonds is burning them. When heated in oxygen or the air, the carbon blackens and burns, forming the gas carbon dioxide (CO_2).

The reader may be amazed to learn that diamonds can burn, or become oxidized. At ordinary temperature the colorless, odorless, tasteless gas, oxygen, is not active; most substances are not affected by it, or are affected so slowly that the action is not noticed. As the temperature is raised, oxygen increases in activity, and unites directly with most of the elements, forming the compounds known as oxides. Sulphur, in air, burns with a feeble light; in oxygen, the flame increases in brilliancy and size. Phosphorus, which burns readily in the air, burns in oxygen with a dazzling brilliancy. Iron, which burns in air only with great difficulty, burns readily in oxygen. Coal, wood, oil, and gas burn readily in air; in the case of oil, no residue is left. For most oils are made up of carbon and hydrogen; and these two, combining with oxygen, form the oxides CO_2, carbon dioxide, and H_2O, or water.

Sometimes oxidation takes place so slowly that no light is seen, and no heat is detected, except by delicate measurements. The decay of vegetable matter, such as wood and leaves, and the rusting of iron, are examples of this. In many cases light is given off, either as a flame, or as a glow called incandescence. These are instances of *combustion,* which is the name for any chemical reaction in which light is evolved. Free oxygen is essential to the life of all organisms except a few of the lowest forms; the utilization of this oxygen is of course an oxidation.

One of the amazing recent developments of chemistry has been the study of *catalysis,* or the influence of certain inert substances, whose mere presence dictates what chemical actions shall or shall not take place. A substance which has this imperial power is called a *catalyst;* the process is called catalysis. The catalyst is not affected at all by the activity which it causes; it can be used over and over again. Duncan gives, as an example, the largely insoluble violet crystals of chromic chloride, which may be left under water for days, without any chemical change taking place. Drop a small amount of chromous chloride, as small as .000,025 of a gram, into the mixture, and the temperature rises, the violet crystals are dissolved, and an indigo-blue liquid results. The mere presence of a minute fragment of the catalyst has suddenly released the powerful affinities locked within the crystals, and the substance is dissolved. It is as amazing as if a handful of some chemical substance should be thrown into the English Channel, and the British Islands would immediately dissolve.

Similar to catalytic substances are the organic bacteria and yeast plants, which produce ferments of great magnitude at a rapid rate. We shall learn more of these in the section on Biology.

The study of chemical crystals deals with the intricate definite geometrical forms which many elements and compounds assume, under certain constant conditions. The group of atoms in a crystal assume a regular arrangement, in a definite pattern. A crystal of rock salt, $NaCl$, for instance, has each sodium atom (Na) surrounded by six chlorine (Cl) neighbors; and each chlorine atom is surrounded by six sodium neighbors, all arranged in a definite pattern. The size of the grouped atoms is about 1/100,000,000th of an inch. The tendency toward symmetry is ever-present; and this symmetry, for all its complication, merely indicates the most effective and convenient method of combination, considering the nature of the atoms concerned.

Even higher than the crystal form is the colloidal form of matter (from the Greek *kolle,* glue). Thomas Graham, in 1861, divided forms of matter, based upon the test of the rapidity or slowness with which they passed through a parchment paper, into crystals and colloids, respectively. Typical crystals are sugar and salt; typical colloids, white of egg and gums. Living matter, it has been discovered, is in the colloidal state; colloids are a step toward life. Matter in the colloidal state has been described as "in the form of ultramicroscopic particles of solid, or droplets of fluid, in suspense or in other matter of dispersion, in another solid, liquid, or gas." It is a less pure and more complicated arrangement than the crystal; and its qualities are now being assiduously investigated by chemists.

CHEMISTRY IN INDUSTRY

The practical applications of chemical research are unbelievably large in number, and complicated in their nature.

The World War, by cutting off the supply of needed chemical materials from certain nations, stimulated artificial means of producing these materials to an unprecedented degree. The United States was cut off from German dye-stuffs; soon our chemists worked out dyes often as good, and at times better, than the original ones. Germany was cut off from her nitrate supply, absolutely necessary for the manufacture of nitrate explosives, as well as for a fertilizer for her fields; her chemists were her salvation, discovering new methods of producing nitrates and ammonia from the air. Chemistry has the two aspects of *analysis* and *synthesis*—taking apart the compounds found in nature, and putting together these and other compounds artificially. At first chemistry was mainly analysis; increasingly today it consists of synthesis, so that we now have synthetic cotton, copper, rubber, wool, and a thousand other necessities. Synthetic processes not only make substances as useful as those found in nature, but make substances far more valuable and suitable, never before found in nature. The synthetic chemist is improving upon the world that Nature made around man.

Certain atoms, like helium and argon, are absolutely unsociable and snobbish; they will not associate with any of their neighbors in any compound. Nitrogen, so necessary to plant and animal growth, is almost as exclusive, showing great unwillingness to enter into combinations, and escaping from compounds with much activity. The value of nitrogen in warfare is that the nitrogen atoms, tightly packed together in a cartridge, at a little disturbance in the neighborhood, such as the flaring up of a little mercury fulminate, scatter so violently from one another, that their eager power hurls projectiles toward the violent death of all men and animals in their way. The ordinary glycerin, a hydrocarbon derivative used in medicine, mixed with nitric and sulphuric acids, gives nitroglycerin, one of the simpler great explosives. Mixed with something stable, like earth or sawdust, we have dynamite; and, when the nitrogen force in this is released, we have death and destruction. If, instead of glycerin, cellulose or woodpulp is treated with the two acids, we get nitro-cellulose or guncotton, the chief ingredient of smokeless powder. Guncotton is a porous solid that has to soak up some liquid, to make it plastic and usable. An unstable liquid, nitroglycerin, that has to be soaked in some porous solid; and a porous solid, guncotton, that has to soak up some liquid: why not combine the two, into a double explosive? This idea occurred in 1878 to a Swedish chemist, Alfred Nobel. He made millions out of it; and left his millions to founding prizes for international peace, and scientific and literary excellence. These prizes did not do 1/1,000,000th the good that his explosives did damage: soon enough the explosives were being used to blow to pieces the embryonic diplomats, doctors, scientists, and artists who might later have won Nobel prizes. Man's destructiveness is far greater than his constructiveness, so far at least.

Two other major classes of high explosives exist—one made from carbolic acid, treated with the two acids already mentioned, forming the British lyddite, the French melinite, and the Japanese shimose; and one formed from toluol, a coal tar product resembling benzine, which, treated with nitric acid, becomes tri-nitro-toluol, called popularly TNT.

All of these need nitric acid, which used to be made from nitrates like saltpeter, or potassium nitrate. But nitrates are rarely found in large quantities. Chile has the largest nitrate bed in the world, a bed made from old guano deposits, a rich manure composed of the deposits of sea-fowls. England's fleet barred this source of nitrates from Germany; whereupon German chemists, by passing electricity through the air, combined the free nitrogen and the free oxygen of the air into nitric oxide (NO). The nitric oxide takes up another oxygen atom, becoming the nitro group (NO_2) of nitric acid, a group found also in the explosives made from this acid. This was called the Schönherr process. The Haber process used the catalyst uranium, and formed ammonia out of nitrogen and hydrogen; from this the nitric acid and the nitrates could be extracted, by oxidation by the Ostwald process, according to the reaction:

Ammonia and oxygen give nitric acid and water.

$$NH_3 + 4O = HNO_3 + H_2O$$

This reaction requires the catalyst platinum, in the form of a fine wire gauze, since the action takes place only on the surface.

If the Allies had the nitrates when the war commenced, Germany had the monopoly of natural potash, as necessary to a healthy soil as nitrates, and almost as hard to obtain. For, while the nitrogen roamed snobbishly through the air, the potash was largely locked up in granite. The romance of our chemical discovery of means of getting potash is as thrilling as the story of the nitrates. We won, and potash may now be unlocked almost as effectively as nitrogen may be imprisoned.

CHEMISTRY IN EVERY-DAY LIFE

Cellulose, the chief organic compound found in woodpulp and cotton, forms the basis for many useful products. Its formula, $C_6H_{10}O_5$, is the same as the formula for starch; but the atoms within the cellulose molecule are arranged very differently from those within the starch molecule, and the properties of the two compounds are unlike. Many pairs of chemical compounds, like starch and cellulose, on analysis prove to be made of the same materials, in exactly the same proportions; but the internal structure of the molecules differ, and the qualities and uses of the products differ. Exactly the same amount of planking and nails may make a cradle and also a coffin; the same group of men, led by one of their number, may be a law-abiding jury, and, led by another, a rioting, destructive mob.

Cellulose is unfit for food, because it will not dissolve in water. One of its chief uses is in paper; this page is almost pure cellulose. By dissolving cellulose in carbon bisulphide, and blowing fine threads of it through a dilute acid solution, the wood-fiber near-silk products are made: cheap sheer silk stockings are merely a product of cotton rags, paper, or sawdust. Collodion, or "New Skin," used in wound dressing, is simply cellulose in solution; imitation leather is produced by spreading collodion, treated with paint colors, upon canvas. Celluloid is cellulose treated with nitric acid, and then mixed with camphor: it can imitate, with appropriate coloring, ivory, tortoise-shell, coral, amber, horn, onyx, and many other natural substances. Thus from cellulose, the chief organic compound in woodpulp and cotton, we get, among other products,

Paper.
Synthetic silk.
Collodion.
Imitation leather.
Celluloid, used in synthetic ivory, etc.

Synthetic rubber is made in a number of ways, but all so far too expensive to be commercially profitable. The chief process is by heating isoprene, a compound of five carbon and three hydrogen atoms; and isoprene may be made from potatoes, or petroleum, or sawdust or turpentine.

The active principle in intoxicating liquors is ethyl alcohol, C_2H_5OH, produced by the fermentation of sugar juices acted upon by a fungous growth known as yeast. The sugar is converted into alcohol, and the liberated carbon dioxide causes the liquid to froth or "work." Methyl or wood alcohol, CH_3OH, made by distilling wood, is both poisonous and offensive to the taste; sudden death and blindness both result from its presence in liquor used for drinking.

Spices or condiments, having no direct food value, are prized for the flavor they impart to food. The characteristic taste and odor of pepper are due to the presence of piperin ($C_{17}H_{19}NO_3$) and oil of pepper ($C_{10}H_{16}$). Cinnamon, made from the inner bark of a tropical tree, has as its chief constituent a complicated aldehyde, or a product produced by oxidizing alcohol; the formula for this aldehyde, which is responsible for the cinnamon flavor, is $C_6H_5CH{:}CHCHO$. Cloves are the dried flower buds of an East Indian evergreen, the taste and odor being due to eugenol, whose formula is $C_{10}H_{12}O_2$. The essential constituent of mustard is the sulphocyanate of sinapin (a vegetable product), the formula being

$C_{16}H_{23}NO_5$. Vinegar is dilute acetic acid, CH_3COOH, and is made from any alcoholic liquid, wine, cider, or beer.

The little seven-year-old daughter of a professor of chemistry, whom I know well, has been taught by her father to ask for food at the table by using the chemical symbols, instead of the usual names. This practice is hardly to be recommended; it is little more than an unnecessary strain upon the child's memory when she has to ask for $C_6H_{12}O_6$, instead of sugar. It is doubtful if she has any of the sense of the miracle of chemical analysis in her treble repetition of letters and numbers. But, by glancing back at the last few formulae, we find that cellulose, starch, ethyl alcohol, wood alcohol, piperin, oil of pepper, the cinnamon aldehyde, eugenol in cloves, the sulphocyanate of sinapin in mustard, vinegar, and sugar, are all composed of only four elements: carbon, hydrogen, oxygen, and nitrogen. These are all gases, found in the earth's atmosphere; and out of these gases, by intricate arrangement of the atoms into molecules, come the familiar liquids and solids, beverages, flavors, foods, and articles of utility, which we have just analyzed. There are thousands more of such compounds. The infinite multiplicity of life and matter, and its essential simplicity of origin, comes to us overpoweringly from an intelligent glance at these queer chemical symbols.

THE COAL TAR DYES

The matter of coal-tar dyes is the chief field in which American chemists ingeniously overcame the initial lead of German chemists. One ton of coal may give:

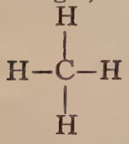
- Gas, 12,000 cubic feet.
- Liquor, in the form of washings, giving 7 to 25 pounds of ammonium sulphate.
- Coke, 1,200 to 1,500 pounds.
- Tar, 120 pounds; which, when redistilled, gives the 10 "crudes" used in making dyes:
  - Benzene, 10–20 pounds.
  - Toluene, 3 pounds.
  - Xylene, 1½ pounds.
  - Phenol (carbolic acid), ½ pound.

Naphthalene (used in moth balls), 3/8 pound.
Anthracene, 1/4 pound.
Cresol, methyl anthracene, phenanthrene, carbazol, a small amount of each.
Pitch, 80 pounds.

Benzine, a kind of gasoline, must be distinguished from benzene, or benzol, used in dye-making.

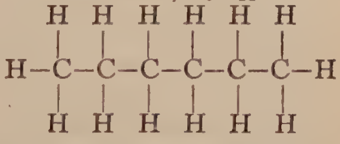
The search for the constitution of benzene, C_6H_6, is one of the major romances of chemistry. Methane or marsh gas, CH_4, shows the simplest relation of these two, the quadrivalent carbon atom and the univalent hydrogen atom. You can picture its structural formula as the four-armed carbon atom in the center, giving each of its four hands to one one-armed hydrogen atom: like a four-petalled flower, with the carbon atom as the center of the blossom, and a hydrogen atom as each petal. Let us draw a structural formula for this: and beside it place a formula for hexane, a more complicated mixture of the same two substances. You will notice that, just as in marsh gas, in the hexane molecule every hydrogen atom is one-armed; and every carbon atom has four arms stretched out, grasping at times the single arm of a hydrogen atom, and at times one of the unoccupied arms of a neighboring carbon atom. Here are the formulae:

Marsh gas, CH_4



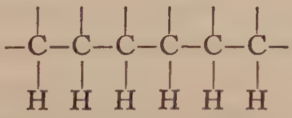
$$\begin{array}{ccccc} & & \mathrm{H} & & \\ & & | & & \\ \mathrm{H} & - & \mathrm{C} & - & \mathrm{H} \\ & & | & & \\ & & \mathrm{H} & & \end{array}$$

Hexane, C_6H_{14}



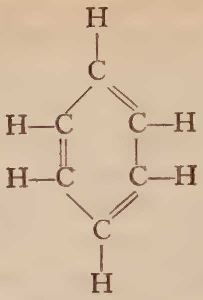
$$\begin{array}{ccccccccccccccc} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \\ & & | & & | & & | & & | & & | & & | & & \\ \mathrm{H} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{H} \\ & & | & & | & & | & & | & & | & & | & & \\ & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \end{array}$$

But what are we to do with benzene, C_6H_6? Clearly, this diagram will not work,



$$\begin{array}{ccccccccccccc} & | & & | & & | & & | & & | & & | & \\ - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - & \mathrm{C} & - \\ & | & & | & & | & & | & & | & & | & \\ & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & & \mathrm{H} & \end{array}$$

for eight of the carbon arms are unoccupied; and one of the laws of chemical union is that every valence bond must be satisfied somehow. The German chemist Kekulé pondered for years on this, and one night his subconsciousness suddenly pictured this circle, of joined carbon atoms, with the six hydrogen atoms holding on the the outside hands in this fashion:



Notice that, in this fantastic figure, every one-armed hydrogen atom clings to one of the four arms of the carbon atom; and the other three arms of each carbon atom are united to their neighboring carbon atoms. This was the clue to the labyrinth; by its aid, thousands of new compounds have been constructed, of great value to man. Early in the process of laboratory substitution, by which other atoms and groups of atoms clinging together were substituted for some atom in this figure, aniline, $C_6H_5NH_2$, the basis of many of the compounds, was discovered.

The structural formulae of some of these coal-tar dyes are almost unbelievably complicated,—all, of course, built upon the discovery of Kekulé given above. One dye, whose trade name is Brilliant Congo, has as its chemical name sodium ditolyl-disazo-beta-naphthylamine-6-sulphonic-beta-naphthylamine-3.6-disulphonate. Its formula, composed of seven of the Kekulé rings joined one above the other, with numerous substitutions, would stretch from the top of this page to the bottom; it contains, instead of the twelve atoms in benzene, 80 separate atoms, representing five different elements.

This is one product of the 10 coal-tar crudes, which make 300 intermediates, and 900 dyes, divided into 5,000 brands. There are more of these constantly discovered.

In 1856 Perkin, a young English chemist looking for quinine, discovered mauve, the first of the aniline dyes. Ten years later, he discovered alizarin, the coloring matter contained in the madder root, the Oriental dyestuff called "Turkey red." The ancient Tyrian purple, formed by a snail-like Mediterranean shellfish, was tremendously expensive; in 1909 Friedlander discovered that it was 6:6′ di-brom indigo, a product already known; and that 5:5′ di-brom indigo, manufactured as easily and cheaply, was a vastly superior dye. Thus man improves on nature.

When the aniline colors had been partly conquered, medicines from coal tar (including salicylic acid used in treating rheumatism, aspirin, phenacitin, and sleep-inducers like sulphonal and veronal) were discovered. Coal-tar products have become indispensable in photography. Synthetic perfumes and flavors, synthetic rubber, infinite uses to which such common vegetables as corn and its oils could be put, wartime use of poisonous gases—these are only a few of the fields that the chemist has entered upon and conquered. The conquests of Alexander and other military despots over the known world shrink before the achievements of the chemist. For he has turned a wider, unknown world into a known world, and still sees before him an infinitely vaster world of the unknown, residing in the supposedly simple substances of the earth around him.

ADDITIONAL READINGS

Any ordinary textbook, such as *A College Textbook of Chemistry,* by Ira Remsen, or *An Elementary Study of Chemistry,* by William McPherson and William Edwards Henderson, gives an adequate study of the elements of the science.

Creative Chemistry, by Edwin E. Slosson (New York, 1919), is an admirably written account of the wonders of applied chemistry in war and peacetime.

The Triumphs of Modern Chemistry, by Geoffrey Martin, is a thorough survey of recent advances in the field.

Chemistry in Daily Life, by Dr. Lassar-Cohn, is the most readable treatment of the application of chemistry to ordinary activities and substances.

3. *Physics*

MECHANICS AND KINETICS

Physics deals with the properties and phenomena of matter, as affected by forces which do not alter the character of the molecules of the matter. From the standpoint of physics, matter is treated as having three forms:

$$\begin{array}{l} \text{Solid.} \\ \left.\begin{array}{l}\text{Liquid.}\\ \text{Gaseous.}\end{array}\right\}\text{Fluid.} \end{array}$$

A solid offers great resistance to a change in its form. A liquid has a free surface, and does not alter greatly in volume under great changes in pressure. A gas has no free surface, but fills the containing vessel, however much it may be enlarged. Liquids and gases are united into the class of fluids, or matter in a flowing form.

Physics begins with certain conventional units, or units agreed upon, of measurement, as of length, surface, and volume. Ordinarily the French metric system, the centimeter-gram-second measurements, is used; although any system, such as the foot-pound-second system in use in English-speaking countries, might be used. The governments of the world maintain their standards of measurement very carefully. The chief units of the systems ordinarily used by physicists are:

The *centimeter,* 1/100th of a meter. The *meter* is the distance between the ends of a bar of platinum measured at the temperature of melting ice. The bar, constructed in 1799, is kept at Paris. It is incorrectly supposed to represent 1/10,000,000th of the distance from the equator to the pole, measured along a meridian on the earth's surface.

The *yard,* the distance between the centers of the transverse lines in the two gold plugs in the bronze bar deposited in the office of the Exchequer in London, measured at a temperature of 62° F. The origin of the measure, roughly, was half the distance a man can stretch with his two arms.

The *gram,* or 1/1,000th part of the standard *kilogram,* a mass of platinum kept at Paris. This was supposed to represent the exact mass of a cubic centimeter of distilled water at its greatest density, or at the temperature of 4° C.

The *second,* 1/86,400th part of a mean solar day, is the unit of time. The solar day is the time between two apparent solar noons, or moments when the sun is on the meridian midway from horizon to horizon.

Mechanics is the study of the motions of masses, and of the effect of forces in causing or modifying these motions. *Kinematics* is a subdivision of mechanics treating of the characteristics of the different kinds of motion, and of the modes of strain in elastic bodies, without reference to the forces involved. *Dynamics,* the other subdivision, treats of the effect of forces in causing or modifying the motions of masses, and in producing strains in elastic bodies. *Statics,* one branch of dynamics, deals with bodies in equilibrium, where the forces involved balance each other; *kinetics,* its other branch, treats of the effect of forces in changing the motion of bodies.

When a body is changing its position, it is said to be in motion. The position of a body can only be ascertained by its distances from surrounding objects; every motion is a *relative* motion. Newton's *Principia,* published in 1686, contained two important laws of motion, the First and Third:

> *First Law of Motion.* Every body continues in its state of rest, or of moving with constant velocity in a straight line, unless acted upon by some external force.
>
> *Third Law of Motion.* To every action there is an equal and opposite reaction.

The first of these has been materially altered by Einstein's researches in physics, challenging the existence of the straight line; we will study this when we reach astronomy. The *inertia* of a body is that property of all kinds of matter, by which its state of rest or motion cannot be changed without the action of some force. There are three measures of force:

1. By the weight it can support (gravitational method).
2. By its power to strain an elastic body (as in the case of an ordinary spring balance, or scales).
3. By its power to give motion to a mass (the dynamical method).

The first method is ordinarily used; its disadvantage is that the force required to support a pound weight varies from place to place on the earth's surface. The second method, due to the change in elasticity caused by temperature and other physical causes, is less accurate. The third can only be applied indirectly; but its unit is called invariable, and is well suited to be the standard unit of force.

The *weight* of a mass is the force with which it is drawn toward the earth. In all problems involving the weight of a body, we may ignore the fact that the weight is distributed throughout the body, and treat it as a single force applied to the *center of gravity* of the body, that certain point in every body through which any force acts, whatever may be the position of the body.

The unit of energy, or the capacity to do work, is the *horsepower* (written H. P.), a unit introduced by James Watt. One horsepower equals the force sufficient to raise 550 foot-pounds per second, or 33,000 foot-pounds per minute. The two kinds of energy are exemplified in a bent spring, and a raised weight. The spring's energy, depending on its internal stresses, is called *potential energy;* the raised weight's energy, computed from two bodies, the earth and the weight, separated in opposition to the stress or attraction between them, an energy depending on the velocity of the mass, is called *kinetic energy.*

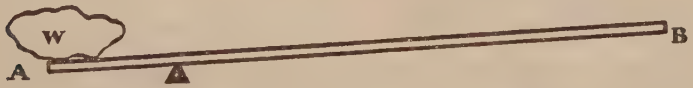
A body upon which work is done thereby acquires the capacity to do an equal amount of work, in returning to its original state. Where a body is pushed across a table, and remains at the same height, with no apparent increase in capacity to do work, the work expended, against the force of friction, has developed *heat* in exact proportion to the work done. Work which seems to be lost in friction is not really lost or annihilated, but is transformed into heat, as another form of energy. Among other manifestations of energy are sound, light, and electric and magnetic actions. The manifestations of energy may be summarized thus:

MANIFESTATIONS OF ENERGY

1. Energy of masses	Masses in motion—kinetic.	
	Elastic bodies in state of stress	potential.
	Gravitation, energy of attracting masses	
	Sound, both kinetic and potential.	
2. Energy of molecules and atoms	Heat.	
	Molecular and atomic energy.	
	Chemical action.	
3. Energy of ether	Electric and magnetic phenomena.	
	Light and radiation.	

The transmutation of chemical elements is difficult; but one form of energy may be transformed into another, and that again into a third; in every change the amount of the energy, as measured by its power of doing work or developing heat, remaining the same. This is the celebrated principle of the Conservation of Energy.

Applied mechanics involves the use of machines, or devices by which the amount or mode of application of a force is changed, for the sake of gaining some practical advantage. Physics has long studied the use of such machines as the rope and pulley; the lever, as AB, where a small force exerted at B, when the fulcrum, F, is near the other end of the lever, exerts a great force at A, on the weight W:



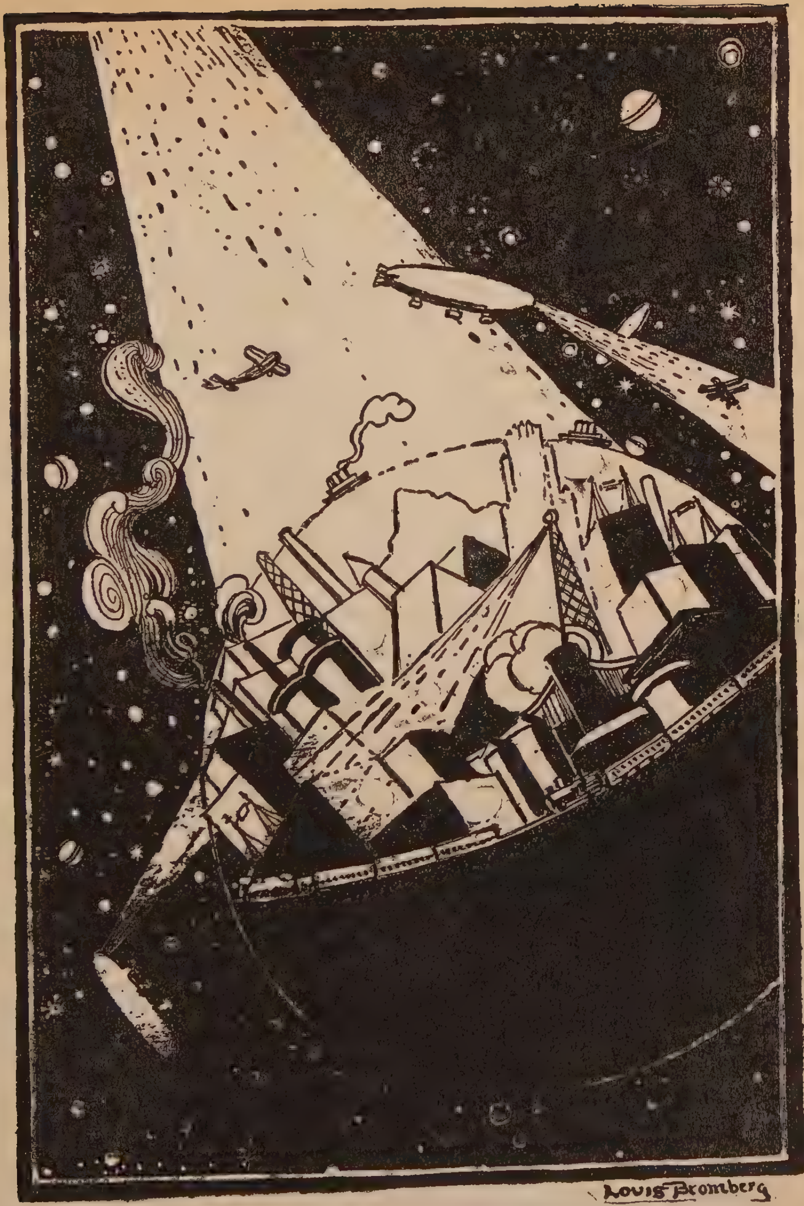
A crowbar used in moving a stone, a hammer used in drawing a nail, are examples of the lever; in this latter case, the fulcrum is at the end, A, the force exerted where F occurs in the diagram, and the force applied at B. It has been pointed out that, according to the above diagram, if the lever be made of a material strong enough, and the distance FB be long enough, a man could raise the weight of a locomotive, or even of the Great Pyramid of Ghizeh, merely by laying his small finger upon the end of the lever at B. Among other simple machines are the crank and axle, the inclined plane, and the screw.

The study of kinematics deals with such every day problems as how a pitcher puts a curve on a pitched baseball (by rotation of the ball, and the resistance of the air); how a pendulum operates in a clock; and the general problems of rotation. The mechanics of liquids and gases forms a separate field of study. Practically applied, the carpenter's spirit-level and water wheels, as well as barometers and thermometers (indicating atmospheric pressure and temperature), are all outcomes of researches in these fields.

SOUND WAVES

The study of sound brings us into the field of wave motion, best known to us in the phenomena of water on a pond or ocean. The physical definition of a wave is: a form or configuration of motion advancing with a finite velocity through a medium. Such a definition might as well be in Greek or Sanscrit, for the reader who is not a physicist: both it, and the Greek or Sanscrit, require long study, in order that each term may be understood. But the appearance of a wave is well enough known. When a stone is dropped into a small pond, water is carried down, and ridged in a circle around the place where the stone was dropped. Immediately water rushes into the momentary depression from all sides; but a part of the ridge moves outward, both momentum and pressure combining to effect this. The energy unleashed by dropping the stone continues to send out gradually lessening waves, until it is expended. The position of each particle of the water in its path (as of two particles on top of two successive waves), is called the phase of its motion. The wave length is the distance between particles in the same phase of motion, as from top to top of two successive waves. The amplitude of a wave is one half of the vertical height of the wave from trough to crest; the velocity, the velocity with which a particular phase of motion moves along: for example, the velocity with which the crest moves along. The frequency of a series of waves is the number passing a particular point per second.

Such waves are surface waves; compressional waves can travel in every direction through an elastic medium. This can be illustrated by waves caused by extending the first spring in a series of balls connected by springs; or by waves set up in the air by a tuning-fork or other rapidly-vibrating body, which excite in our ear the sensation of sound. Such waves, in air or a similar medium, are called sound waves. In a compressional wave (like a sound wave) the particles vibrate longitudinally, or back and forth in the direction of advance of the wave, and there is a progressive change in


Louis Bromberg

Machine-made madness, smoke that shrouds
All the young starry clouds,
Swirl and swivet and distress,
And an endless search for happiness.

phase, in consequence of which alternate regions of compression and rarefaction are produced.

There are three principal proofs that sound is communicated by compressional waves through material bodies:

1. Sound is not communicated through a vacuum.
2. The motions of sounding bodies are such as might be expected to set up compressional waves.
3. The observed velocity of sound is the same as that of compressional waves, both in air and other mediums.

Moll and Van Beck, two Dutch observers, determined the velocity of sound in air in 1823, by timing the interval between seeing the flash of the discharge of a distant cannon, and hearing its report. The velocity of sound was found to be 1,093 feet, or 333 meters per second, at a temperature of 0° C. The study of reflection (turning back of a wave) and refraction (change of direction, when the medium changes, as from air to water—illustrated by the apparent bending of a stick in water), studied in water waves, led to the study of the same phenomena in sound waves, where the same principles were found to apply.

Sounds that have a sustained and simple character, and do not seem to be a mixture of various different sounds, are called tones or musical sounds. Sudden sounds that convey no idea of musical pitch, or mixtures of discordant sounds, are called noises. The intensity of a tone depends upon the amplitude or energy of the vibration; the pitch, on the frequency of the waves; and the quality, on the particular manner of vibration of the particles. The study of the sounds produced by the various musical instruments is complicated, and has been well worked out by physicists.

Middle C on the piano vibrates 261 times in a second; the second C above vibrates 522 times, or exactly twice as much; while the notes between vibrate as follows: D, 292.9; E, 328.8; F, 348.3; G, 391.0; A, 438.9; B, 492.6. There are definite limits to the sounds which the human ear can hear; insects can make and hear higher, shriller tones, while other animals can make and hear lower tones than the deepest bass the ear can register. The lowest tone the human ear can recognize as a musical tone has a frequency of about 16 vibrations per second; the highest tone differs, in different ears, from 20,000 to 40,000 vibrations per second.

HEAT, MAGNETISM, ELECTRICITY

The study of heat deals extensively with the expansion and contraction of solids, liquids, and gases, at changes of temperature. A heated body radiates heat to surrounding bodies. These vibrations come from inconceivably rapid vibrations in the molecules of every body; the heat of a body exists, in part at least, in the form of energy of motion of the molecules. Even bodies considered cold have this molecular vibration, and therefore radiate some heat. Heat also exists in bodies in other forms, as in the potential energy stored up, due to the expansion of the bodies when heated, which means that the molecules are pushed further apart, and that the force required to do this is stored up in them in the form of potential energy. A change of state, as from solid to liquid (as when ice melts) or from liquid to gaseous (as when water, by heat, is changed to steam) also engenders heat, both requiring heat from outside, which is stored up in the body in the form of potential energy. The reverse changes, as from water to ice, and from steam to water, uses up some of this potential energy. Bodies differ much in their conductivity of heat, or their power to transmit heat freely. Practically applied, all devices for heating owe their improvement to this branch of physics.

The study of magnetism was based first upon natural magnets, which have the power of attracting iron filings. The mariner's compass utilized this discovery. It was soon found that every magnet has a positive and a negative pole; like poles of two magnets attract each other, while unlike poles repel each other. If a magnet is broken up, each fragment still shows a negative and a positive pole; and these poles are always equally strong. Magnetism thus is a condition which prevails throughout the entire mass, and polarity is merely an external manifestation of the condition.

Magnets may communicate their power to steel or iron; this quality is called induction. The study of the fields of force of a magnet reveals astonishing conclusions. The earth itself attracts magnets, toward the north magnetic pole, a point northwest of Hudson Bay. The study of magnetism is closely tied to that of electrical phenomena. Man slowly found methods of harnessing the natural electricity, and of engendering it (as from the force of falling water in a waterfall) by transforming one form of energy, the gravitational, into another, the electrical. It is thus that our cities in the main are lighted; although a method used as widely is the transformation of the energy stored in coal into electrical energy. Lightning is the chief natural expression of electricity.

An electrical current flows from the positive to the negative conductor. Electricity has been found to control the workings of the magnetic needle, indicating a kinship between the two forms of energy. The power of electricity in dissolving chemical compounds was next investigated, resulting in the production of many chemical substances of great value to man. The practical utilization of electricity, in the form of electromagnets, lighting systems, telegraph, telephone, the wireless telephone or radio, electric heating and propulsive power, and in the electric motors which furnish so much of the energy that is utilized in our manufacturing civilization, is one of the great scientific advances of today.

Out of these studies came researches into the properties of the cathode rays; Röntgen or X-rays, so powerful that they can photograph the interior skeleton of the body in spite of its envelop of flesh; and the amazing new field of radioactivity, an atomic phenomena by which certain chemical elements constantly eject energy. Chemicophysics has now worked out the whole chain, from uranium and thorium, through ionium, into radium, then into helium, and in the end to lead. One gram of radium gives out, in the 2,000 years it takes to alter its substance to a stable instead of a radioactive mass, more than 1,000,000 times more heat than is given out in the combustion of a gram of coal; and this tremendous released energy is only a small fraction of the total internal atomic energy of radium. Scientists dream of tapping this source of energy, by disintegrating the atom; and at any time steps toward this, or the achievement itself, may take place.

As has been indicated in our study of chemistry, all matter is now believed to be composed of energy, the atom consisting of the positive proton and the negative electron, or some number of these. This is called the electron theory of matter. Moreover, the structure of the system of one atom (composed of its protons and electrons) indicates that the mass of it is almost exclusively space. The most solid matter is merely energy operating in space.

WAVES OF LIGHT

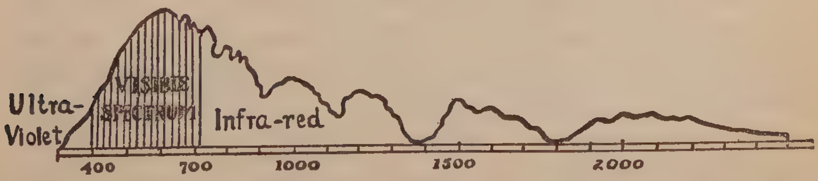
Sight requires three things: an object to be seen, an optical organ (as the eye) to see with, and light. Light, old physics taught, travels in straight lines, at a speed of 186,317 miles, or 299,810 kilometers per second, these being Simon Newcomb's 1882 figures. There is no difference in the velocities of lights of different colors; light apparently has a constant speed, irrespective of color. Physicists soon decided that light traveled in waves; but, since there is neither water nor air in the starry distances of the universe, what are these waves made of? A hypothetical substance named ether was soon assumed. Hertz established that electric waves could exist with the same velocity as light, which bore out the theory that some such medium as ether existed. The study of the reflection and refraction of light is utilized in the making of mirrors, eyeglasses, microscopes, and telescopes, with lenses which diminish or increase the apparent size of the object seen, in vast degrees. The lens, a piece of glass or other transparent surface usually bounded by spherical surfaces, was used in the final three of these.

It was soon discovered that light, passed through a prism, separated into a colored band called the spectrum. Sir Isaac Newton, placing a second prism in the path of each color, established that there was no further division into color.

The prism, then, did not produce the color, but simply separated the various kinds of light already present in a beam of sunlight. The index or measure of refraction of the prism was found to be different for each kind of light in the spectrum, being least for the red, which is least refracted, and greatest for the violet, which is most strongly refracted. Measurement of the wave lengths revealed that the longest waves are at the red end of the spectrum, and the shortest at the violet end. The rainbow is an example of a spectrum produced by rays of light upon spherical drops of water. The camera, the cinema lantern or moving picture lantern, the microscope and the telescope, are examples of the application of the science of optics, or vision.

Moreover, it was discovered that the composition of the substance which, heated to the point of incandescence, gave out the light, could be ascertained by an analysis of the dark lines formed on the spectrum. These lines, called Fraunhofer lines from the physicist who first isolated them, differ for each chemical element. Thus the chemical substances composing any sun or star which is incandescent or luminous may be ascertained by the use of the spectroscope.

The complete spectrum, when photographed, shows rays beyond the violet rays, of shorter wave length, called the ultra-violet rays, which have curative and other properties; and that beyond the red of the spectrum are rays of longer wave length, called infra-red rays. A design of the complete spectrum, showing distribution of energy in the sun's spectrum, plotted by wave lengths in millionths of a millimeter, gives us:



Light waves are evidently electromagnetic, and must therefore originate in electric charges which vibrate or oscillate in some way in the atom. According to the electron theory, the source of light and of all radiation from the atom is found in the vibrations of its electrons.

The color of self-luminous bodies is due to light waves which they themselves emit. The colors of non-self luminous bodies are due either to:

1. Selective absorption, as in colored glass, pigments, and most colored bodies; or
2. Selective reflection, as in metals and bodies showing special luster.

Non-luminous bodies show no color in the dark; their color comes exclusively from the light with which they are illuminated. When light is divided up by a prism into the spectrum, a piece of red paper, held in the red rays, appears red; held in the yellow, green, or blue rays, it appears black, for it absorbs all these rays. So a blue paper may reflect the violet, blue, and green (all containing blue), but appears black in the red, orange, and yellow parts of the spectrum. A white paper will reflect whatever color falls upon it.

White is a combination of all the colors of the spectrum. Two colors which, when combined, produce white, are said to be complementary. By means of the color disks it is found that blue and yellow of the proper tints and intensities produce white, as may red and green. The three primary colors are ordinarily said to be red, green, and blue; contrary to the old physics, which taught that red, blue, and yellow were the three.

The development of man's perception of the colors is a striking study of the science of physics, as aided by philology (the science of languages) and other aspects of sociology. We have Max Mueller's authority for the statement that Xenophanes recognized only three colors in the rainbow, purple, red, and yellow; that Aristotle spoke of the tri-colored rainbow; and that Democritus knew of only four colors—black, white, red, and yellow. Geiger establishes that at the time of the primitive Aryans, perhaps 15,000 to 20,000 years ago, man was conscious of only one color: he saw no difference in the tints of blue sky, green grass, brown earth, gray stone, golden flower, and purple and pink clouds of sunset and sunrise. Primitive Indo-European and Sanscrit had no word-roots to indicate colors.

The first colors recognized were red and black; such ancient games as chess and draughts or checkers, with their red and black pieces or men, point to this. Moreover, in dreams (which use a primitive utterance of sensations) there is ordinarily no color, and its absence is not missed. The dream scene seems entirely lifelike, with (as a rule) no element of color. So colorless photographs or moving pictures impress us as actual representations of the scenes and people presented. In the cinema, red is permitted and regarded as natural, to indicate a fire scene; but, to most people, the green tint for moonlight is always regarded as artificial, where the gray-black and red are not.

At the time of the Rig-Veda, yellow was added to the colors man distinguished; later white; and then green. But throughout the Rig-Veda, the Zend Avesta, the Homeric poems, and the Bible, the color of the sky is not mentioned once, indicating that it was not recognized. Thousands of lines in these ancient writings describe the sky; but its color was utterly ignored, undoubtedly because it was not perceived.

The English word *blue* and the German *blau* come from a word that means *black*. The Chinese word for sky-blue formerly meant black. The Persian and Arabic *nil,* for blue, is akin to *Nile,* the black river, in turn kin to the Latin *niger,* black. To primitive eyes, red seems to have included white, yellow, and all intermediate tints; while black seems to have included blue and green in all their shades. We will reach this again in that branch of sociology called philology.

GRAVITATION; THE RADIO

The one branch of physics not hitherto discussed is the subject of gravitation. Galileo was the first scientist to determine how bodies fell. He showed that, except for air resistance, all falling bodies accelerated at the same rate. The acceleration of gravity may be taken as 32.16 feet per second. Kepler, in 1609, applied the study of gravity to the motions of the planets around the sun; and Newton's *Prin-*

cipia, published in 1686, uttered the famous generalization that all masses, great and small, attract each other with a force proportional to the square of the distance between them. He held that the falling of an apple was governed by the same law that swung the moon in its orbit. The force of gravity (from which weight is measured) differs at different points on the earth's surface, determined by these three things:

1. The earth is not a sphere.
2. The earth rotates.
3. Its surface has different heights, measured as above sea level.

Physics accepted the Newtonian principles of gravity, and the idea of the straight course of light, until the present century. The corrections made by Einstein and others will be discussed under astronomy, the science next to be considered.

One of the most important modern applications of electricity has been the development of wireless telegraphy and wireless telephony, called radiotelegraphy and radiotelephony, or, in popular speech, the radio. Marconi, building upon the investigations of Hertz on the production of electric waves, in 1896 discovered wireless telegraphy; wireless telephony soon followed. Electrical wave lengths, of different lengths for the different stations, are produced and transmitted, and received at special receiving stations; thus telegraphic messages, and spoken words, as well as all sounds, may be sent and received. Wave lengths vary from 125 to 20,000 metres; and the number of radio receiving apparatuses in the United States and throughout the world reaches into the millions.

ADDITIONAL READINGS

For a general survey of the field, any standard textbook, such as *A College Textbook of Physics*, by Arthur L. Kimball, or *Practical Physics*, by N. Henry Black and Harvey N. Davis, will act as a general introduction to the science.

4. *Astronomy*

THE SOLAR SYSTEM

Astronomy is the science of inorganic and organic matter in its largest groupings. It deals with the constitution, structure, and motions of the universe and its elements. Its subjects of study include:

1. Incandescent bodies, made visible to us by their own light—such as suns or stars, nebulae, and comets; and
2. Dark bodies, revolving around them or around each other.

We shall deal first with our own sun's family group; and then turn to the vaster starry systems outside: giving a final glimpse to our own earth.

Sir William Herschel has given us a word picture of the solar system. On a circular field, five miles across, place, in the center, a globe two feet in diameter. This represents the sun. A mustard seed 164 feet away represents Mercury; a pea, 284 feet from the center, Venus; a pea 430 feet away, the earth; a large pin's head 654 feet off, Mars; grains of sand 1,000 to 1,200 feet away, the asteroids; a moderate sized orange half a mile away, Jupiter; a small orange four-fifths of a mile away, Saturn; a cherry a mile and a half away, Uranus; and a plum, two and a half miles away, Neptune. The diagram given indicates roughly these positions:

In addition to the bodies mentioned, the solar system contains at least 26 moons or satellites tributary to the planets, and circling round them as the earth does around the sun; the more than 1,000 asteroids, or little planets, between Mars and Jupiter; hundreds of delicate filmy bodies called comets; and lastly, untold billions of meteors, which constantly strike the other bodies, those hitting the earth being our familiar shooting-stars. Let us take these up, beginning with the sun.

THE SUN

The distance of the sun from the earth is used by astronomers as a yardstick to measure other distances in the starry heavens. This measurement has been checked up in various ways, which all tally. It is ascertained to be 93,000,000 miles. Knowing this distance, it is easy to figure the size of the sun, from the amount of space (over half a degree) which it fills in the heavens. From this, elementary trigonometry tells us that the sun's diameter is 865,000 miles. Since the earth's diameter is nearly 8,000 miles, the sun's is

110 times larger; and the sun's volume is therefore 1,331,000 times that of the earth. Careful measurements of the sun's weight indicate that it is only 330,000 times greater than the earth's. Thus we learn that the sun's bulk is nearly one-fourth lighter than the bulk of the earth, part for part; that is, the sun's density is about one and one half times as dense as water. The combined weight of all the planets, moons, and comets is hardly 1/750th of the sun's weight.

On the earth's surface a body would fall some 16 feet the first second; on the sun's surface, it would fall 444 feet. So great is gravity, that the world's champion athlete, on the sun's surface, could only jump 3 inches in a running high jump.

The moon seems bright at night; but its brightness is only 1/500,000 of the brightness of the sun. Careless observers say that the light of the full moon is as great as sunlight; it would take 500,000 full moons to equal the sun's light. If the sky were solidly covered with moons, we would receive only one eighth the light of the sun. The sun's light expressed in terms of candlepower would be 1,575,000,000,000,000,000,000,000,000,000. The brightest artificial earth light, interposed between our eyes and the sun, looks like a black spot on the sun's face. Our intensest artificial heat is now about 4,000° F.; the temperature at the sun's surface is 16,000° F. One square meter of the sun's surface is hot enough to generate 100,000 horsepower continually. Distant as we are from the sun, the annual sun's heat received by the earth is sufficient to melt a layer of ice on the earth's surface more than 100 feet thick. Yet so evenly is the sun's heat distributed throughout the sky, that the earth receives only 1/2,200,000,000ths part of it.

The tornado that recently desolated Florida and wrecked the city of Miami travelled at the rate of 120 miles an hour, or 2 miles a minute. On the sun's face, vast storms of white hot gases move at a speed of 6,000 miles per minute, or 360,000 miles per hour. Such a storm, striking New York City, would carry the Statue of Liberty to San Francisco, 3,000 miles away, in half a minute. The heat at the sun's center is supposed to be millions of degrees; matter here is in the form of ions, only resolving into recognizable elements as it moves toward the cooler surface.

How is this vast heat of the sun maintained? The favored explanation is contraction of the sun's huge mass upon itself, or shrinkage, which generates heat. So slow is this rate of shrinkage, that centuries must pass before the most delicate human instruments can detect any change in the sun's size. It is also possible that some form of radioactive energy is the explanation. If the shrinkage theory is the correct one, the sun is probably from 20,000,000 to 50,000,000 years old, in form about as at present; and, if the contraction continues as it is said to take place now, in 5,000,000 years the sun should shrink to half its present diameter. And all human history, from the earliest Egyptian and Babylonian records through the World War, is less than 8,000 years!

A strange feature of the sun's face is the presence there of sun spots and solar prominences. Some of the spots seem to be depressions; some, definitely elevations. One seen in 1858 was at least 150,000 miles in breadth (almost 20 times the whole diameter of the earth). A spot must be nearly 30,000 miles across, almost four times the size of the earth, to be seen with the naked eye. Sun spots at times form with great swiftness, in a few hours; two or three months is the average duration of the spots. The longest in duration, in 1840-1841, lasted 18 months. Since the sun rotates in 28 days, this same spot reappeared more than 18 times to human observers.

The real cause for sun spots is not yet known. It is known that a prevalence of spots upon the sun causes electrical and magnetic disturbances upon the earth, and a greater frequency of the strange Aurora Borealis. The margin of the sun shows, especially during eclipses, strange nebulous prominences. At times these reach the enormous length of 100,000 miles away from the sun's rim.

The inner core of the sun seems to be composed of gases, at the intense heat mentioned, and in a state of compression, perhaps of the consistency of melted tar or pitch. Outside are a number of shells or layers, one being the solar corona, still a mystery to science. No element is found on the sun that does not appear on the earth; and most of the elements found on earth are also discovered in the sun; the spectroscope being the instrument by which the elements are detected.

THE INNER PLANETS

Lescarbault, a French physician, announced in 1859 that he had seen a planet inside of Mercury, crossing the sun's face, which he named Vulcan. No subsequent astronomer has been able to see this; and it is regarded today as a scientific myth.

Mercury is an elusive body that few, even among astronomers, have ever seen. I have seen it on only two occasions, both requiring highly fortuitous weather conditions, and very early rising. It is not very bright, moves rapidly, and is always close to the sun, either sinking just after the sun, or rising just before it. Mercury goes through the phases of the moon—crescent, quarter, full, quarter, waning crescent. It is believed that it presents always the same face to the sun, as the moon presents always the same face to the earth. Its atmosphere, if it has any, is very thin. Mercury is 36,000,000 miles from the sun, and moves most swiftly of all the planets. No moon for this planet has been discovered.

Venus is brightest of all the planets. Like Mercury, it shares the phases of the moon. Its atmosphere is denser than ours. It lies 67,000,000 miles from the sun, and comes within 26,000,000 miles of the earth. So brilliant is it, that it may be seen at times in full daylight. Its diameter is 7,700 miles, as compared with our 7,920; it is almost as large as the earth. Its year is seven and a half months, or 225 days. No real moon is known to attend the planet.

THE MOON AND ECLIPSES

The moon, the earth's satellite, or attendant planet revolving around the earth, is only 238,800 miles from the earth; its whole orbit would be lost upon the sun's vast face. Its speed around the earth is 3,350 feet a second, or 2,290 miles per hour. Its diameter is 2,162 miles; it would take 50 moons merged into one to make a ball as large as the earth; due to the fact that the volumes of solids are to one another as the cubes of their diameters. Its density is only 2/3 that of the earth; and, since its gravity is only 1/6th of the earth, athletes on the moon could leap up 36 feet, and broadjump nearly 150 feet.

The telescope reveals the moon as a vast crater-pitted rocky desolation, a dead world, without atmosphere, water, or life. The largest telescope in the world (like the 40-inch Yerkes Observatory telescope) would bring the moon's surface 100 miles away from us; but, at a distance of 100 miles, on earth's surface, the naked eye could see few details. More than 30,000 craters have been counted on the moon; the height of the moon's mountains exceeds the highest earthly peaks. From the moon's surface, our earth would appear like a moon four times broader than the moon we see; for the earth's diameter is about four times the diameter of the moon. The side of the moon turned toward the sun is, due to lack of atmosphere, so cold that the rocks could not be touched with comfort; on the side away from the sun, the temperature falls to that of space, or many hundred degrees below zero.

No happening in the heavens filled primitive man, and indeed early civilized man, with more amazement than eclipses of the moon during the night, and eclipses of the sun during the day. Yet the cause, science ascertained, is simple; and future eclipses can be predicted by science more definitely than it can predict the weather for the next 24 hours. An eclipse of the moon, at night, is caused simply by the earth passing between the moon and the sun, so that the earth's shadow darkens the moon's face temporarily. An eclipse of the sun is caused by the moon passing between the earth and the sun, so that the moon's shadow darkens the sun's face temporarily.

The earth's shadow, since the sun is so much larger, stretches away from the earth into space, growing smaller and smaller, until at length it comes to an end—the apex or small end of a cone 857,000 miles long. This shadow always tails away from the earth, a lessening darkness whirling across bleak space, like a black searchlight darkening light, its blackness constantly growing less. We are not aware of this shadow, until it falls upon some illuminated object, as the moon. We have learned that the moon is only 238,800 miles away; and, at this point, the earth's shadow is about 6,000 miles in diameter, as contrasted with the moon's diameter, 2,163 miles. As an eclipse comes on, the eastern rim of the moon is darkened for half an hour or more, because the moon must first pass through the outer half-shadow, or penumbra, which everywhere surrounds the true shadow. The moon may pass through only the upper or lower part of the earth's shadow, giving a partial eclipse. If the moon passes directly through the very center, the eclipse lasts about two hours as a full eclipse, with a partial eclipse for an hour before and after; because it takes the moon an hour to move across its own breadth or apparent diameter in the sky.

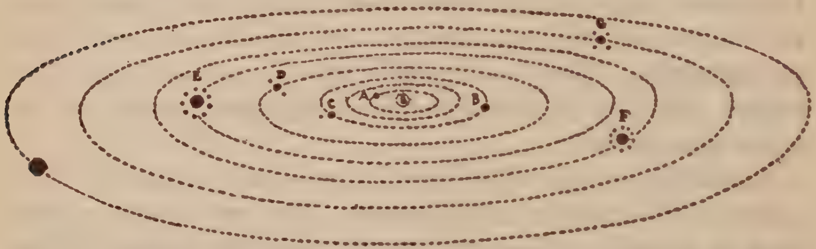
Even when the eclipse is total, the moon's body is visible, as a dull tarnished copper disk. This is caused by the reddish sunlight which grazes the earth all around, and is bent or refracted by our atmosphere into the shadow itself. If this belt of atmosphere is everywhere full of dark clouds, as in the 1886 total eclipse, the moon will entirely disappear. Eclipses of the moon may be seen from any part of the earth's surface; eclipses of the sun are visible only from a relatively narrow belt on the earth. To the superstitious Chinese and all throughout India, a total eclipse of the sun is caused by a great dragon with black claws, who would wholly eat up the sun, if the earth's people did not frighten him away with wild hideous noises. In Japan, people believe that the eclipse drips poison from the sky into the wells; so the Japanese cover all wells while it lasts.

The first recorded eclipse of the sun occurred in the ancient Chinese writing the Shu-king, this eclipse occurring in the year 2,158 B.C. Assyrian tablets describe in detail an eclipse in Nineveh in 763 B.C., perhaps the eclipse referred to in Amos, viii, in the Old Testament. The first predicted eclipse was that forecast by Thales of Miletus, an ancient Greek scientist and philosopher, and occurring in 585 B.C. The Medes and Lydians were fighting at the time; and the popular fright caused by the eclipse was followed by immediate peace, cemented by two royal marriages. The first English eclipse recorded was that in the Saxon Chronicle, 538 A.D. During the time of the Arabian Nights, several eclipses were recorded in Bagdad; one occurring in 1560, when Tycho Brahe, the early astronomer, was fourteen, turned his attention toward astronomy. The eclipse of 1612 was the first "seen through a tube," or telescope. The European eclipse of 1842 saw astronomical observation finally well under way; the corona of 1851 was the first recorded by the new art of photography. Not until 1860 was it proved that both corona and solar prominences were sun phenomena, and not moon phenomena.

Considering the whole earth, there are about 70 total eclipses of the sun in every century. But any man in a given place is lucky if he observes one total eclipse during his lifetime. No total eclipse was seen in London between 1115 and 1715. The longest total eclipses are seen near the equator. Important eclipses of the future will be that of June 8, 1937, over the Pacific Ocean; that of June 20, 1955, through India and Siam; and that of June 30, 1973, visible in the Sahara and Abyssinian regions of Africa. The 1937 eclipse will last 7 minutes and 20 seconds; the maximum length is 7 minutes 58 seconds.

The sun's corona is still largely a mystery to science. This can only be studied during the rare eclipses of the sun; and, considering the vast expanse of earth covered by water, unsuitable for minute astronomical observation, and the equal chance of clouds being present, the total time for observation of the corona shrinks to less than one week in 100 years. We see the corona only from the sun's rim; but the sun is a globe, not a circle, and the corona radiates in every direction from it, somewhat like quills from a porcupine. The corona is triple: the polar rays, branching from the sun's magnetic poles in straight lines, and curving as they grow more distant from the poles; the inner equatorial corona; and, lastly, the outer ecliptic corona, made up of long streamers which may merge into the zodiacal light. Its brilliance varies, from less than that of a full moon, to four times as bright. It is largely bluish in tint; and the long streamers at times are more than 11,000,000 miles long, or thirteen times as long as the sun's diameter. Theories of its nature vary, including gaseous matter, meteorites, and disintegrating comets, complicated with electrical discharges.

THE OUTER PLANETS



THE SOLAR SYSTEM. The Sun (S) is in the centre. The planets are: A—Mercury, B—Venus, C—Earth, D—Mars, E—Jupiter, F—Saturn, G—Uranus, H—Neptune.

Mars is the planet next outside the earth's orbit; its distance from the sun averages 141,500,000 miles. It moves with relative rapidity, is tinted reddish, and is easily observable. The planet turns on its axis, with a day only a few minutes longer than ours—its day being 24 hours, 37 minutes and 22.67 seconds. The year, however, is 687 days long; and while there is some conflict among the authorities, the accepted opinion today is that there is an atmosphere surrounding Mars, less indicated by masses of clouds than by temporary darkenings of well-recognized features on the planet's surface, this being testimony supplemented by delicate photography and the use of the spectroscope. These reveal that the atmosphere there is very thin, compared to the earth's; the amount of oxygen being only one-third that found on the top of the Mount Everest, the earth's highest mountain. The diameter of Mars is only 4,200 miles, much less than the earth's; and in weight, Mars is 1/9 the weight of the earth, and the moon 1/80th. The inequality of the seasons is such that, in the northern hemisphere, the Martian winter lasts 381 days, and the summer only 306 days.

The heat received by Mars from the sun is only about half what the earth receives. In certain years, as 1894, the summer heat was nevertheless sufficient to melt all the Martian polar ice cap. Lowell's claim that he observed a retreating polar sea is not generally accepted; any more than Schiaparelli's famous 1877 announcement that he had discovered vast canals on the planet's surface. Photography has aided the eye in seeing this curious network of markings; usually straight (that is, following the great circles of the planet), varying in length from 250 to 4,000 miles, and at times joining like the spokes of a wheel. The breadth of the canals varies from 12 to 20 miles, to perhaps 200 miles. Schiaparelli concluded that these established artificial irrigation, to distribute the water released by the melting polar cap; Pickering holds that they are not water at all, but bands of vegetation following the changing seasons. Many astronomers still deny the existence of these markings.

There is no dissent about the two moons of Mars, small bodies of only 10 or 20 miles in diameter, contrasted with our moon's diameter of 2,163 miles. The inner moon, Phobos, moves around Mars three times while the planet turns only once on its axis, leading some to suppose that it was never a part of the planet, but was captured by Mars from the asteroid group.

The question of whether the planets are inhabited depends on the qualities of what we call life. Protoplasm can stand low temperatures, but on earth its living properties cease at a temperature of 150° F. Man lives, on the average, between 75 degrees below zero Fahrenheit, and 115 above. Water, essential to life as we know it, exists as a fluid only between 32 and 680° F. The high temperature of Mercury would forbid the existence on it of life as we know life. Venus is a possible home of life. The moon, with no appreciable air, no water, and a temperature oscillating between 100° F. during the day and 300 below zero, or lower, at night, by this test could not be inhabited. Mars might have been inhabited in the past, if not now; varied forms of life, requiring less oxygen than earthly creatures, might dwell on it. The asteroids are too small to have a satisfactory atmosphere for life, scientists say; Jupiter and Saturn are too hot, although Saturn's vast moon, Titan, as large as Mars, and the three inner Galilean moons of Saturn, might hold life. Distant Uranus and Neptune are too far away for intelligent speculation.

The outer suns or fixed stars, which we shall reach soon, may have planetary systems similar to our own sun's system; their distance makes the discovery of these, with man's present methods, impossible. Yet by analogy there is reason for supposing that the processes which produced life here may repeat themselves thousands or millions of times throughout the universe; and there is no reason to doubt life in many places. Its course of evolution may differ vastly from that on earth; some instances producing creatures we would call lower, and some producing creatures we might call infinitely higher in the life scale. Moreover, there is no scientific reason why different combinations of matter might not produce activities which could be called life, differing in every way from the earth's, as respects temperature, atmosphere, and the other needs of earthly life. This is matter for speculation merely.

Between Mars and Jupiter, by the ratio of distances of planet from planet, there exists a gap. Astronomers looked in vain for a planet here; and at last began to look for evidence that a planet had disintegrated, or failed to cohere, at this distance from the sun, where one was expected to be found. In 1801 Piazzi discovered the first of the expected fragments, a small body which he named Ceres. Discoveries have multiplied since, until today nearly 1,000 of these little planets are known and identified. The largest of these little planets or asteroids, called Vesta, is only 400 miles in diameter; the total magnitude of all of them is far less than that of any great planet. The accepted theory to account for them is the nearness of the great mass of Jupiter, which may have prevented the gaseous nebula here from cohering into one planet.

Jupiter, the giant among planets, is even less of a sphere than the earth, turning around its axis once every 10 hours, as opposed to the earth's 24. This bulges out the equatorial regions of Jupiter, and draws in its polar regions. Jupiter has four large moons, travelling faster than the earth's—the inner one circling Jupiter four times a week, the outermost in 18 days. The planet also has one closer moon, and four distant ones. Jupiter is the brightest of all the planets except Venus; it is five times brighter than Sirius, the most brilliant of the fixed stars or outer suns. Its year is twelve of ours.

Saturn, its brilliance that of a first-magnitude star or sun, travels around the sun in about 30 years. The telescope reveals great rings or bands, unlike anything else in the solar system, surrounding the planet; and ten moons or satellites in addition. There are at least four rings: an outer ring, sometimes divided near its middle; an inner, broader, and brighter ring; and a darker inside ring, sometimes called the crape ring. The thickness of the rings is about 100 miles. Recent observations have established that each is made up of millions of separate particles moving around the planet, each like an individual satellite. In 1857 it was established that the rings could not be gaseous, liquid, or solid; in 1895 Keeler established, from measuring the rate of rotation of the inner and outer parts of the rings, that they were made up of separate particles, each travelling as if a separate satellite. The innermost particles of the dusky ring, for example, travel around Saturn in about 5 hours; the outermost particles of the outer bright ring require 137 hours to make the circuit. Astronomers are not agreed as to how the rings came into being; possibly the planetesimal hypothesis of Chamberlin and Moulton, of the capture of small particles by the great planet's gravity, may be the real explanation.

In 1781, Sir William Herschel discovered the planet Uranus, till then unguessed. It may barely be seen with the naked eye. It is 1,800,000,000 miles from the sun, and requires 84 of our years for its revolution of the sun. Its diameter is about 30,000 miles, and its four moons have a path different from other members of the solar system.

In 1846 a further planet, Neptune, was discovered, 2,800, 000,000 miles from the sun, with a year more than 164 of our years, and with about the same diameter as Uranus. Only one moon has yet been discovered for this planet. Astronomers are now seeking to discover one or two planets beyond Neptune. So far, their observations have not met with success.

COMETS AND METEORS

Comets, from a word meaning "hairy stars," are the side-show freaks of the skies. Even more than the brief sponging out of light by eclipses, their bright tailed advent filled earlier men with fright. The first comet whose course was plotted was Halley's, late in the 17th century; and Halley established that this had been seen earlier in 1531 and 1607, and would return in 1758, 1910, and 1986, its long ellipse around the sun taking between 75 and 76 years. The brightest comets on record were those seen in 1843 and 1882; these could be seen while the sun was shining. The former of these had a tail which swept across the sky from horizon to horizon.

Comets, usually first seen at about the distance of Jupiter from the sun, are seen by their own incandescent light, not by the sun's light. When first seen, the comet is a body of faint, hazy light, perhaps 4,000 miles in diameter. As it nears the sun, its nucleus or head becomes brighter, and throws off streamers toward the sun, which merge into that general nebulosity or incandescent gassiness called the head, often from 30,000 to 100,000 miles in diameter. The development of the tail follows, the particles apparently driven backward by the sun, expanding like a hollow cone, at times strangely curved, and reaching 100,000,000 miles in length. The gaseous matter thus forced away in the tail is lost in space; the comet grows less on each return, in the end being an opaque, non-luminous body which cannot be seen.

The prevailing theory is that comets come from outer space. While their size is enormous, their mass is relatively very little. The earth's atmosphere weighs about 1/250,000th of the earth's weight; a comet weighs less. On at least one occasion the earth passed through the tail of a comet; the only apparent effect was on the comet. The probable effect of a head-on collision would be that the comet would be burned up in the earth's atmosphere, causing an unprecedented falling of meteorites, or the so-called shooting stars.

One of the smallest comets, and the one with the shortest period around the sun, is Encke's, which takes only 3½ years to return. Biela's comet took nearly 7 years; about 1840 it divided into two comets proceeding side by side, and both of these have now disappeared. Astronomers can never tell when the next bright comet will come into view. Between 1850 and 1900, bright comets appeared on the average once every 8 years. Small comets, visible only through the telescope, may be seen nearly every year.

Meteorites or shooting stars, according to the accepted opinion today, indicate that interplanetary space is thickly peopled with moving bodies, very small in mass and dimension, which only become visible when they collide with our atmosphere. This collision heats them to incandescence; usually they are consumed in vapor before reaching the earth's surface, but at times they strike the earth as meteorites. The earliest recorded meteorite fall is that mentioned in the Parian Chronicle as falling in Crete in 1478 B.C. The sacred black stone built into the Kaaba at Mecca, still worshipped by Moslems, is a meteorite. In 1805 a fall of meteorites in the department of Orne, France, brought down more than 2,000 stones, striking in an area 6 miles long by 2½ broad.

The accepted theory of their origin is that they come from the disintegration of cometary masses. Certain years, and certain months of every year (November, August, April, and December) are especially favorable for showers of meteorites. Contrary to the general belief, all large meteors, when they strike the earth, are very cold; the friction caused by passing through our atmosphere has merely caused a fusing of the exterior to incandescence, easily brushed off, its heat soon overcome by the interior cold. A meteor seen to fall in India, and dug out at once, was discovered to be, not hot, but coated with ice, drawn from the moisture in the soil.

The total weight of all the meteorites falling upon earth's surface in an average year is between 30,000 and 50,000 tons; but in 1,000,000,000 years this would only add a layer an inch thick over the earth's surface. An iron meteorite can be easily distinguished from earth's iron rocks, due to the network of lines it exhibits when nitric acid is poured upon it. Carbon has been found in meteorites and the existence of diamonds has been conjectured. More than one-third of all the known elements have been discovered in meteorites; but no new elements. No trace of germs or organic life, of any kind, has ever been discovered. The meteorites are much less radioactive than the ordinary rocks of earth. These falling stars are merely chips of the comets of the solar workshop; the so-called fixed stars, suns at infinitely remote distances, are not kin to them.

THE NUMBERS OF THE SUNS

So far, our description of the heavens has been confined to our sun's immediate family. In passing outward to the untold millions of stars or suns, we reach a group of bodies, not dark like the planets and moons, but self-luminous or incandescent, like our sun and the comets. Some of these, the "dwarf suns," are smaller than our suns; most of them, the "giant suns," are infinitely larger. The overwhelming distance of these bodies is the first thing that staggers the imagination. Next to this is their seeming countlessness. The naked eye, in northern and southern hemispheres can count from 5,000 to 6,000 of these suns or stars. Each increase in the power of the telescope multiplies the number to almost fabulous proportions. Present optical instruments can detect between 400,000,000 and 500,000,000 of these separate suns. By photography, even with the present instruments, this number would easily reach 1,000,000,000.

Astronomers classify these by the simple test of the amount of light we receive from these stars. This is entirely irrespective of their real size; a close star, quite small, might give much more light to eyes on earth than a tremendous one, much further away. The stars are thus classified into magnitudes, with the following number to each magnitude:

20 1st magnitude stars, Sirius being the brightest, and Canopus the next.
65 2nd magnitude stars, giving 2½ times less light than the average 1st magnitude star. Polaris, the north Pole Star, is 2nd magnitude, as are the stars in the Great Dipper.
200 3rd magnitude stars, dimmer in the same ratio.
500 4th magnitude stars.
1,400 5th magnitude stars.
5,000 6th magnitude stars. These are barely visible on the clearest nights, without telescopic aid.
20,000 7th magnitude stars.
65,000 8th magnitude stars.
235,000 9th magnitude stars.

Telescopes carry the magnitudes up beyond the 20th, each decreasing in brightness in the same ratio. In this ratio, with Sirius magnitude 1, Venus would be magnitude 4.3, and the sun magnitude 26.7.

From these facts, the total light of the stars can be estimated. The light from the stars we cannot see, strangely enough, exceeds the total light from stars we can see. The total light of all stars down to magnitude 9½ is 1/80th the light of the average full moon. If every visible star were surrounded by 79 stars as bright as itself—and there are more than 7,000 visible stars—the total light of all these visible stars would only equal the full moon's light.

Many stars differ sharply in the color of their light; and the stars are now classified scientifically by their colors. Among these classifications are:

Red stars, like Aldebaran, Betelguese, and Antares.
Yellowish stars, Capella and Alpha Ceti (Alpha in The Whale).

Blue stars, Vega and Sirius.
White stars, Procyon and Polaris, the Pole Star.

Among the stars visible only in the telescope are many blood-red in color, including many variable stars, or stars whose magnitude apparently increases and diminishes. Double stars, also, are often complementary in color. We have some evidence of change of color in stars: Sirius, 2,000 years ago, was called a red star; now it is blue or bluish white. This change made be due, as we have seen in physics, to an alteration in man's perception of color. The color may be connected with the radiative intensity of a star, or with its age. One hypothesis is that a young star is bluish white, then white, then yellowish, orange, red, and lastly invisible. This is not universally accepted.

Eudoxus, in 200 B.C., was the first man known to have set down the positions of the brighter stars on a celestial globe, or globe of the starry heavens; Hipparchus, 130 B.C., composed the first known catalogue of stars, a list of 1,080 stars. An Arabian astronomer named Ulugh-Beg, son of the conqueror Timurlane, in 1420 A.D., was the next man to compile a star catalogue. In 1580 Tycho Brahe's list added little to that of Hipparchus. Then the telescope was invented; recently Argelander covered the northern hemisphere, and Gould the southern, these two together listing some 700,000 stars. This is a work that can never be entirely finished.

The stars were given names in groups called constellations, such as Ursus Major (the Great Bear, containing the Great Dipper); Orion, the hunter; Leo, the lion; and the like, from fancied resemblances to these objects, buttressed by early myths. Individual stars were first named from their positions in the constellations. Thus Cor Scorpii (heart of the Scorpion), was first named from its position in the Scorpion; later it was named Antares. The Arabs adopted many star names from the Greeks, and named perhaps 100 stars independently. When the fainter stars began to be identified by hundreds and thousands, Bayer, a contemporary of Galileo, originated the present system, by which the stars in a constellation are named with the Latin genitive of the constellation's name, prefixed by—

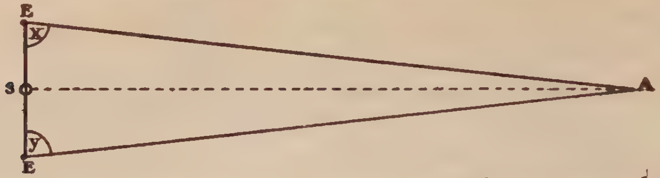
1. The Greek alphabet. Thus Alpha Lyrae is the 1st star (or alpha) in the constellation of the Lyre.
2. The Roman alphabet, when the Greek alphabet becomes exhausted.
3. Numbers.

The vast bulk of the stars are nameless and undesignated; about 1,000,000 are named by their position on the celestial sphere. This position is called right ascension (the star's angular distance eastward around the celestial sphere, starting from the vernal equinox) and its declination (north or south of the equator).

The solar system lies roughly in a plane; thus, from the earth's surface, sun and planets are always seen along one great circle of the starry heavens. This expanded plane has been called the zodiac; and its 12 divisions, corresponding roughly to the 12 months of the year, have been named from the 12 most prominent constellations in the successive twelfths of the zodiac. These so-called signs of the zodiac are representatives of the following constellations: Aries the Ram, Taurus the Bull, Gemini the twins, Cancer the crab, Leo the lion, Virgo the virgin, Libra the scales, Scorpio the scorpion, Sagittarius the archer, Capricornus the goat, Aquarius the water man, and Pisces the fishes.

THE DISTANCE OF THE SUNS

The fixed stars are not fixed; they change their position in small degree, which astronomers have measured. The average proper motion of the brightest stars is 0″.25 (¼ of a second a year); stars of the 6th magnitude have a motion only 1/6 as great. The distance of a star from the earth is measured by its parallax, obtained by using the diameter of the earth's circuit of the sun, observed from two places in space six months apart; and the two angles then formed between the line connecting earth and sun, and the line connecting earth and star, as by the following diagram, where the base of the triangle is much exaggerated:



Here A is the star whose distance is to be measured; S the sun; and E and E′ the two positions of the earth, six months apart. The distance EE′ is known; the two angles AES and AE′S, marked x and y, are known; from these, it is easy to figure AS, the distance of the star. This is expressed, not in miles, but in terms of *light-years,* or the time that it takes a ray of light (travelling 186,317 miles a second) to reach the earth from the star. A second method of expressing starry distances is in *parsecs,* a parsec being about 3.25 light years, the distance of a star whose parallax is 1″ (one second) of an arc.

By parallax measurements, the following are among the closest stars to us, starting with the very nearest:

Alpha Centauri, 4.33 light years away.
61 Cygni (star 61 of the Swan), 7.2 light years.
Sirius, 8.5 light years, or 2.33 parsecs, approximately 50,000,000,000,000 miles away.

Procyon is 11 light-years away; Altair, 15; Vega and Arcturus, 30; Capella, 54; Rigel, in Orion, 500; the Hyades, 130; the Pleiades, 325; the blue stars in Orion, 600. Only a few hundred parallaxes have been ascertained, so intricate is the process. Some of the fainter stars have relatively large parallaxes, while some of the brighter have no parallax as yet measurable. Thus Arcturus and Canopus, two of the brightest stars in northern and southern hemispheres respectively, for long were unmeasurable. Canopus has been shown to have a parallax of 0″.03, making it more than 100 light years away. If the star were as near as 61 Cygni, it would be 100 times as bright as Sirius, brightest of all the suns. As to the brightness of these distant stars in comparison with our sun, Sirius is 26 times as bright, Vega and Arcturus

60 times as bright, each of the stars in the spectroscopic binary Capella are 100 times as bright, and Rigel, in Orion, 13,000 times as bright.

We have mentioned the proper motion of the "fixed" stars. One orange-yellow star, of the 8th magnitude, in the southern constellation Pictor, has a motion of 9″, or nine seconds a year; another, whose parallax is 0″.52, indicating a distance of 6.27 light years, has a proper motion exceeding 10″.

The sun, surrounded by its spiralling planets, is likewise moving through space; and some astronomers have wondered if there is not evidence of some central sun, around which it is revolving. Alcyone in particular has been conjectured as this central body. There is no reliable evidence to support this. Observations by Herschel showed two great tidal waves of the stars, one widely scattered group moving radially (as from the center of a circle toward its circumference) from the constellation Hercules, and another group toward the opposite side of the stellar sphere. The goal of this latter group, among which is our sun, is over in the constellation Lyra; the other group tends toward a point halfway between Sirius and Canopus. The sun is moving, with his family group, toward Lyra, at about the rate of 12 miles in every second. After thousands of years, the sun's motion will alter the position of many stars, as will the tidal sweep of the stars themselves. The picture of the universe furnished by these discoveries is of two vast star streams, drifting through each other, interpenetrating as they go. The cause of this motion is as yet only conjectured.

Draper was the first scientist to take a spectroscopic photograph of a star; since his time, the method has been applied to thousands of stars. A close resemblance has been discovered between a star's spectral type and its luminosity, as well as between its spectral type and its speed. It has been ascertained that the older stars have far greater velocities than the younger stars; thus stars start with a slow motion, which later increases. The planetary nebulae moves still faster; which might imply that the planetary nebula is the final stage in star evolution.

STAR CLUSTERS

Between one-fifth and one-half of all the visible suns are binaries, or systems consisting of two stars (either both incandescent, or one luminous and one dark) which revolve around each other. Science has not yet ascertained any explanation of this system of double stars. There are also triple, quadruple, and multiple stars, or systems of suns revolving around each other. It has been possible to get the actual measurements of some of the suns, with astonishing results at times. Thus Betelguese, in Orion, is found to have an actual diameter of 260,000,000 miles, contrasted with our sun's 865,000 miles.

Researches have also been made in new stars, and other variables. Some are irregularly variable, as Eta Argus, which varied from 4th magnitude in 1677 to a bright 1st magnitude between 1822 and 1836, and then dimmed away to its present state of magnitude 7½. Some fluctuate in regular periods; at times a dark twin star revolving around the lighted one is the explanation. Algol is the best known of this type. Another type, instanced by omicron Ceti, is explained as being caused by the fact that the star is still a meteoric swarm, uncondensed, with periodic collisions, causing the regular increases in brightness. Some of the new stars apparently owe their brightness to the sudden expulsion, at regular periods, of vast quantities of gas. It is doubted if collisions are responsible, in any large number of cases. The new stars may, however, be caused by the contact of one or many meteor swarms with some nebula.

The star clusters are one of the vast unsolved problems of the heavens. The Pleiades, and certain other nebulous clusters, are visible to the naked eye, as patches of nebulous light. Such a globular cluster as the one in Hercules, when photographed, reveals a cluster of more than 50,000 stars; of these, more than 35,000 in this one star cluster are brighter than our sun, some being 1,000 times as bright. Omega Centauri, a great cluster in the southern hemisphere, whose combined light is hardly more than a 5th magnitude star, has literally countless stars. There are about 100 of these globular clusters; their velocities are somewhat like the speeds of the spiral nebulae. Shapley has estimated the distance of many of these bodies as having a parallax of about 0″.00012, corresponding to the amazing total of 30,000 light years; the cluster in Hercules is about 36,000 light years away. This would place the clusters far outside our familiar Milky Way universe of stars. The most remote of the globular clusters, known to astronomers as N.G.C. 7006 (N.G.C. standing for New General Catalog of Nebulae by Dreyer) is 67 kiloparsecs away. A kiloparsec is 1,000 parsecs, or 3,256 light years; this places N.G.C. 7006 as more than 200,000 light years away. To word this more clearly, the light that reaches us now from N.G.C. 7006 left that cluster 200,000 years ago; if the cluster had ceased to emit light 100,000 years ago, eyes on the earth, if they exist that long, would still see it for 100,000 years in the future.

Shapley suggests that these vast globular clusters can exist only in empty space; and that when they enter a region tenanted by stars, they dissolve into the loose clusters and star clouds of the Milky Way. Most of the star clusters known are travelling toward this region; some will enter it in something like 100,000,000 years.

Closer to us are certain moving groups of stars, called moving clusters, which seem to be moving in the same direction. It is suggested that they originated from the same nebula, and have travelled since side by side. One such system comprises five of the seven stars of the Great Dipper, together with eight other stars, including Sirius and Alpha Coronae Borealis (alpha, in the Northern Crown). The Hyades, the Pleiades, the bright stars in Orion (including the nebula in its sword) are among such moving clusters.

THE MILKY WAY

The Milky Way, midway of which is our solar system, is a belt, zone, or flattened disk of cloudlike luminosity, extending all the way around the heavens, as we see them. One half of it, to an observer on earth, is always below the horizon; since its plane makes a large angle with the equator, it constantly alters its angle with the horizon. Galileo's telescope taught him that this was not a sheet of faint light, but was made up of countless stars, invisible to the naked eye. Such stars are more thickly packed in some places; and cluster most in the Milky Way itself. If all stars visible in a 12-inch telescope were blotted out from the sky, almost all that remained would be the Milky Way.

In places its light is interrupted (as in the "coal sack" in Centaurus) by dark starless regions, which may mark a starless window out of our universe, but more probably indicate the presence of some dark nebula of gigantic extent. Kapteyn has discovered that the Milky Way has no connection with our solar system, but is composed of stars infinitely remote, and different in constitution. Its distance from the sun is estimated variously by astronomers, ranging from earlier figures of between 1,000 and 5,000 parsecs, or some 16,000 light years, to the figures of Seares, which give the diameter of the Milky Way as almost 100,000 parsecs, or 300,000 light years. The thickness of the disk is about one-eighth of the diameter, or 37,500 light years, by the figures of Seares. Poincare holds that the whole Milky Way is in stately rotation, requiring about 250,000,000 years for a complete revolution.

THE NEBULAE

A century ago, the transition from star clusters to nebulae was thought an easy one. The spectroscope determined that the nebulae are not composed of stars, but of gaseous matter. Since their distance has been found to be comparable to that of the stars, and their reach across the heavens is far vaster, it is clear that they are the bulkiest objects in the heavens. Bigourdan has measured about 7,000 nebulae; over 15,000 have been photographed, catalogued, and tested by the spectroscope. Among the irregular nebulae are the great nebula of Orion (containing hydrogen, helium, and nitrogen, according to the spectroscope), with a multiple star prominent in it, and a faintly spiral form. The Pleiades cluster and its nebula has been shown to be strangely bound together. There are also a few annular or ring nebulae, as the one in Lyra; its size is about 300 times the diameter of Neptune's orbit.

Most important of all are the spiral nebulae. The most striking one is in the constellation Canes Venatici, showing on the photographic plate a nebulous whole with many star-like condensations. The central portion should revolve most swiftly; observation extending over many years has shown no movement. The great spiral nebula in Andromena has a length seven times the apparent breadth of the moon, and a width half as great. Hundreds of thousands of these have been located or discovered by computation; next to the stars, their number is the greatest of any object in the sky. Curtis estimated it to be over 700,000. Many are filled with stars in process of condensation; it is as if here we have caught the production of starry systems midway. Their distances are very great, Curtis holding that many lie between 500,000 and 10,000,000 light years, which would make them "island universes" outside the Milky Way universe wholly. Their speed, some twenty times that of the stars, indicates that they may be such island universes, each one similar in extent to the Milky Way universe of stars, near whose center our sun is found.

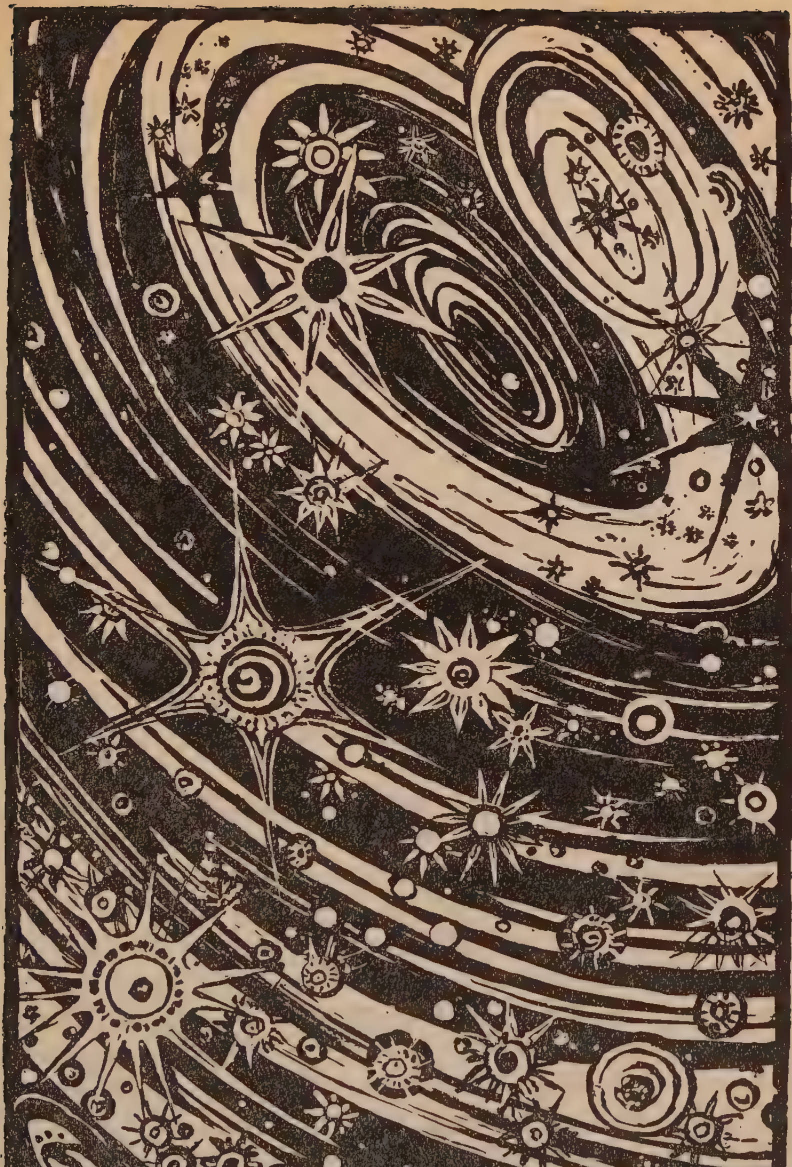
THE ORIGIN OF THE UNIVERSE

This completes our survey of the universe. How did it come into being—this tremendous whole, of which we may know only a suburban or rural trifle, or even merely some desert oasis, far from the opening temperate zones and the rioting hot tropics of starry existence? The so-called nebular hypothesis was first enunciated clearly by the philosopher-scientist Kant. In his writings, he held that all the materials which now compose the universe existed first in their original elements, filling all space in which they now move; that by gravitation the denser portions drew centerwards, drawing upon themselves the less dense portions, which set up whirling motions; and that in the end this continued until many spherical bodies, each with a gaseous exterior in process of condensation, had replaced the original undifferentiated universe of original chemical elements.

It seems clear that such a process would result, not in a collection of bodies like our solar system, much less like the Milky Way universe; but rather in one vast single central sun, without planets, moons, satellites, or other suns outside. The elder Herschel, a student of nebulae, ascertained that in the heavens we see nebulae in all processes of condensation toward solar systems; and he took steps toward the formulation of a hypothesis of the origin of suns and planets from the nebulae.

At the beginning of Book I: *The Outline of History,* we sketched briefly the contribution of the French astronomer Laplace to the theory, which since his time has been known by his name. His theory began the evolution of the solar system with a vast fiery nebula, in whose center the sun formed and hardened. The whole mass, center and vast incandescent atmosphere, he conceived to have a steady rotation about its axis. With rotation of the mass and slow reduction of temperature in the outer regions, there would be contraction toward the solar center, and an increase in velocity of rotation, until the whole mass had been much reduced in diameter at the poles, and proportionately expanded at its equator. When the centrifugal or center-fleeing force of the outer equatorial masses became equal to the gravitational forces of the central mass, then these conjoined outer portions would be gradually left behind as rings, still revolving at the speed they had acquired while attached. The inner revolution continues, velocity increasing, until a similar equilibration of forces was again reached, when a second rotating ring would be left behind. Laplace conceived the process as continuing until as many rings had been detached as there are individual planets.

There were nine or more heated gaseous rings, not all existing as rings at the same time, of course; for radiation from a ring on all sides would lead to rapid mass contraction, forming many nuclei or centers of formless condensation, all revolving around the central sun in practically the same pe-



In the beginning was energy, cloven,
In the frigid skyey oven,
Into matter and whirling force,
In universe on universe.

riod. This process continued until the largest aggregation or nucleus had drawn to itself all the other separate nuclei in the ring, and a planet in embryo was thus formed—a diminutive sun, incandescent, axially rotating in the same direction as the parent nebula. A similar process might construct smaller planets, or moons, from this nebulous planet, encircling it. Saturn's rings, by this theory, were so homogeneous that the lack of a dense nucleus caused a survival of the ring formation; although, as we have seen, this ring is known now not to be gaseous, but to be formed of small particles of solid matter. The nebulous ring formed after Jupiter and before Mars, either through the same cause, or a collision, or the attraction of the nearby giant planet Jupiter, similarly failed to cohere into a planet, and we have the zone of asteroids, or little planets.

By this theory, the outermost planet Neptune, or some further planet, was formed first; and the other planets in due order, moving from the outside of the solar system inward to Mercury at the end, or some planetoid body still closer to the sun.

Subsequent criticism reaches usually to details of the theory, rather than to its essence. Yet it may well have been that the original form of the planets was that of gaseous protuberances or lumps on the central body, which became detached and cohered into planets. Chamberlin and Moulton, studying the numerous spiral nebulae largely unknown in Laplace's day, incline toward great gaseous swirls caused by the near passing of some giant sun near our own, resulting in such protuberances. Less than one per cent of the sun's mass, ejected in this fashion, would be sufficient to generate the entire planetary system. This planetesimal theory, so called from the emphasis given to small bodies gradually captured by the chief nuclei, is accepted by many astronomers today. Moulton further held that the moon had never been a part of the earth, but was captured; although others suggest that the break in the earth's crust now occupied by the Pacific Ocean might mark the original site of this tiny chaperone of the earth.

EINSTEIN LIMITS THE UNIVERSE

A word must be said about the use of mathematical formulae, in such scientific work as Einstein's revision of astronomy. When we reach psychology, we shall discover that the intellect's work is later and more fumbling than an accurate intuition, where the mind leaps from situation to conclusion without the awkward intermediate steps. Original thoughts come, perhaps exclusively, through intuition. Thousands of observers had seen apples fall from trees; Newton was the first who saw in a flash the connection between this and the vast gravitational force that makes all bodies fall, that holds planets rotating around suns, and ties in an intricate network of forces the universe together. This thought was an intuition of what is called a scientific law, which means no more than a generalized description of phenomena apparently invariably successive to one another. To satisfy other scientists of its correctness, Newton had to clothe this intuition in mathematical formulae, the brain's fumbling explanations. Today, when the elementary facts of gravitation are to be taught, mathematical formulae are unnecessary. It is enough for the average reader to understand the broad outline of the theory.

So with every theory. The discovery that the earth moves around the sun, instead of the reverse, had to be established to men's minds at first by long and intricate mathematical formulae; today, a civilized child is told, as a matter of course, that the earth revolves around the sun; and no mathematics is needed to establish it, or to explain it. Thus the most intricate scientific theories, rooted in fact, pass from elaborate mathematical formulae buttressing an intuition, formulae intelligible only to scientific specialists, at last into simple kindergarden facts, easily grasped by any child. Every fact in the universe may be worded as simply. Instead of dealing with the dry formulae of Einstein's discoveries, we shall word them as simply as they will come to children a hundred years from now. It is no harder to understand than that chickens are hatched from eggs by hens or incubators.

A mathematical wording of a fact is a confession of human ignorance, not of human erudition; the heart of the fact is the important thing.

TIME AND SPACE

Let us, then, start by ignoring strange mathematical hieroglyphs, and all talk of contravariant and covariant vectors, tensors, scalars, determinants, orthogonal vectors, and generalized symbols of three signs—merely manmade bugaboos serving chiefly to frighten away the inquiring mind; and see what the core of Einstein's discoveries amounts to. Let us look first at conceptions of two underlying abstractions, Time and Space, as they appeared to men before Albert Einstein.

Since Aristotle, men have held that there is an absolute time, and an absolute space. Aristotle says,

> There is one single and invariable time, which flows in two movements in an identical and simultaneous manner; and if these two sorts of time were not simultaneous, they would nevertheless be of the same nature. . . . Thus, in regard to movements which take place simultaneously, there is one and the same time, whether or no the movements are equal in rapidity.

Epicurus is one of the few dissenting voices since Aristotle's dictum:

> Time has no existence of itself, but only in material objects, from which we get the idea of past, present, and future. It is impossible to conceive time in itself independent of the movement or rest of things.

Newton was of the majority opinion, phrasing clearly both absolute time and absolute space:

> Absolute, true, and mathematical time, taken in itself and without relation to any material object, flows uniformly of its own nature. . . . Absolute space, on the other hand, independent by its own nature of any relation to external objects, remains always unchangeable and immovable.

Henri Poincare first scientifically punctured this improper picture of time and space, after Kant had indicated the subjectivity of both:

> One cannot form any idea of empty space. . . . From that follows the undeniable relativity of space.

Poincare points out that, if all the dimensions in the universe were increased 1,000-fold in one night, the world would remain to us the same; since our standards of measuring space would increase in the same proportion as the objects to be measured. The same thing would follow if time in the universe were to be quickened, or slowed, 1,000-fold; for the watches and clocks would accelerate or retard at the same rate, and no earthly observer could guess that any change had taken place. From this follow these apparent paradoxes:

> 1. When there is no measuring rod, there is no space. Space (to us) is created by measuring rods.
> 2. When there is no clock or measure of time, there is no time. Time (to us) is created by clocks.

This sounds hard to understand. So did the idea that the earth moves around the sun seem once impossible of comprehension, since it apparently flew in the face of all human observation. Both are easy, once man has thought them out.

Does the earth's envelop of ether travel with the earth? The phenomena called aberration, in astronomy, establishes that it does not. When a star is observed through a telescope, the image of the star is not precisely on the line of vision. This is because, while the luminous ray of the star is passing down the tube of the telescope, the instrument has been slightly displaced by the earth's movement. The luminous ray in the tube does not share the earth's movement; hence the star is displaced, by that slight deviation which we call aberration. Thus the ether does not move with the earth.

The Michelson experiment sought to test this another way. If a man rows 20 miles an hour down a stream flowing 10 miles an hour, his speed downstream will be 20 + 10, or 30 miles an hour; his speed upstream will be only 10, or 20 − 10. Michelson, using two stations a known distance apart in the direction of the earth's motion, measured the speed of light from one, A, to the other, B, in the direction of the earth's rotation; and also the speed of light from B to A in the direction contrary to the earth's rotation. Letting V equal the velocity of light (slightly more than 186,000 miles a second) and R the speed of the earth's rotation, it is clear that the first result should have been $V + R$, and the second $V - R$. Instead, both gave V. This experiment proved that the ether *did* move with the earth's movement. The facts known about aberration proved that it did not. In such a deadlock of experiments, what is science to do?

It must find some explanation to solve the deadlock. The explanation of the Irish Fitzgerald and the Dutch Lorenz, explaining the Michelson experiment (called the Fitzgerald-Lorenz hypothesis) was simply that the two stations A and B moved toward each other just enough, in the direction of the earth's rotation, and from each other, in the direction the reverse of the earth's rotation, to neutralize the expected addition or subtraction of R, and to leave V as the result in both cases. No facts bore out this hypothesis. It would explain the facts, if it were correct; but there was no evidence that it was correct.

Einstein's answer to this deadlock was based upon well-known phenomena of optics. What determines for us the apparent length of a measuring rod? It is the image made upon our retina by the two rays that come from the ends of the rod, and which reach our eye *simultaneously.* The italicized word is the key of the whole matter. If the rod is stationary before us, and we stationary before it, the case is simple. But if it is moved while we are watching it, or we move while watching it, does it keep its same length, or alter? Classic science said that it kept the same length; Einstein's answer is different.

Suppose a steel train stands at rest before me; I stand midway of its distance. I place a white peg at the front end, a black one at its back. The rays of light leave the two pegs, and the front and back of the train, at the same instant, and reach my eye at the same instant. Now suppose (using all of your imagination) that an engine of incredible strength pulls the train by me at a fantastic speed, millions of times faster than any earthly engine could move it. Will the train now be, to me the same length as before? That is, at the moment the front of the train coincides with the white peg, will the back end coincide with the black peg? When the front end coincides with the white peg, the rays of light from both will reach my eye at the same time. At the same time, a certain ray of light (which we will call the back ray) reaches my eye from the back of the train; will this coincide with the ray from the black peg? Clearly not. The ray from the front end of the train, at its vast speed moving away from my eye, travels more slowly toward my eye than the ray from the back, although my eye cannot perceive this; for, when the rays reach my eye, they have the same velocity. Hence the ray from the back must have left the train *after* the ray from the front; therefore, *after* the back has passed the black peg. Therefore the length of the train travelling at this speed, to me, is shorter than the distance between the two pegs, the length of the train at rest.

Thus any object is contracted in proportion to its velocity, and in the direction of that velocity. The same thing would happen if the observer moved at a similar speed, while the object stood still. We can know only relative velocities. Thus, to an observer inside the train, the distance between the two pegs would be less than it is to the observer outside. Movements on earth are all relatively slow; a shell fired by that vast cannon called "Big Bertha" leaves the muzzle with a velocity of only 1,300 metres a second. For movements as slow as this, the contraction caused by velocity is almost negligible. Shapes change in the same way, at the vast speed we have imagined; a square would be an oblong, or rectangle; a circle would alter to an ellipse.

The result in time is similar. The time expressed in seconds which a train takes to pass from one station to another is shorter for the passengers on the train than for us who watch it pass, although our watches may be just the same as theirs. In fact, the best definition of the second is this:

the duration that light takes to cover 186,000 miles, far from any strong gravitational field.

The apparent dimensions of an object (the *space* occupied by it) depend upon its velocity; again, time itself (measured by a watch) depends upon velocity. This indicates some profound relationship between space and time. Modern physicists have now drawn the significant generalization that time is the fourth dimension of space; or that the space in which we live has four dimensions.

Einstein showed further that, when an observer is moving, a moving object released by him does not have, to us, as velocity, the sum of two velocities (as classic mechanics had it), but a lesser velocity. The old formula was, with w the resultant velocity, v the velocity of the observer, and y the velocity of the released object;

$$w = v + y$$

Einstein's formula is (C being the velocity of light)

$$w = \frac{v + y}{1 + \frac{v\,y}{C^2}}$$

Thus, if an observer was on an object moving 200,000 kilograms a second, and released an object from his moving platform at the same speed, the resultant velocity would not be 400,000, or the sum of the two, but only 277,000. The formula expresses that the resultant velocity, however great, cannot be greater than the speed of light; and also that, if one of the component velocities is that of light, the resultant must always have the same value as this component. These results follow, if the formula is accepted as correct.

Experiments made of the velocity of light in water (220,000 kilometers a second) establish that the Einsteinean formula is correct. When velocities are relatively low (as in all cases studied by classic physicists) the difference between the two formulas is so slight that the classic formula gives approximately the correct result. It is only when we have higher velocities that the Einsteinean formula alone explains the results obtained.

MASS AND VELOCITY

Einstein explains the retardation of accelerations by pointing out that the mass of a body is not constant, but increases with its velocity, thereby offering an increasing resistance to the accelerating force. Mass increases with velocity, and becomes infinite at the velocity of light. Here are the increases in a mass of 1,000 grammes at given increases of velocity:

Velocity	*Mass plus increase*	
1,000 kilometres a second	1,002 grammes	
100,000 " " "	1,060 "	
200,000 " " "	1,341 "	(double its original mass).
259,806 " " "	2,000 "	
290,000 " " "	3,905 "	

The verification of these figures comes from our studies of the cathode and radium Beta rays, which consist of a bombardment by electrons. By testing the deviations of such rays exposed first to an electric field and then to a magnetic field, we can learn both the velocity of the projectile, and its mass (related to the known electric charge of the electron). The velocities of the radium rays reach 290,000 kilometres a second, not far short of the velocity of light. The result of constant experiments shows that mass varies with velocity, in exact accord with the numerical laws of Einstein's formulae.

We had previously found that all matter was energy. This is merely another way of stating Einstein's splendid deduction, that mass and energy are the same thing, or two aspects of the same thing.

So much for Einstein's Theory of Special Relativity. His Theory of General Relativity took up the problem of gravitation, starting with Newton's celebrated law: Bodies attract each other in direct proportion to their masses, and in inverse proportion to the square of their distances. Yet Einstein had demonstrated that mass varies with velocity; and that measurements of distance vary with velocity, differing with the velocity of each observer. Accordingly, Einstein showed that gravitational weight and inertia are indistinguishable.

From this he went on to the necessary deduction, epoch-making in astronomy:

> Light does not travel in a straight line in those parts of the universe where there is gravitation, but its path is curved like that of heavy objects.

The proof of this, astronomically, was simple. If Einstein was correct, light passing near the sun would be bent inward slightly. At the time of an eclipse, this could be photographed, by comparing the apparent distance apart of two stars, whose distance, when the sun was removed, was well known by photography. Calculation showed that this angle should be equal to 1¾″ (one second and three-quarters). A total eclipse, visible in both Americas, occurred on May 29, 1919. Astronomers carefully photographed, some weeks before, groups of stars, then visible at night, which would mark the place where the eclipsed sun would be. During the eclipse, they photographed the same stars. Feverishly they bent over the developing plates; the truth or error of Einstein's magnificent theory of light might depend on these dull altering plates. If Einstein was right, the stars would be, apparently, further apart, since the rays of light coming from them had been bent in toward the sun. The photographic plate cleared; the stars were definitely further apart, at the expected angle. Facts had verified the theory of Einstein.

How does Euclidean geometry fare, in the light of Einstein? One of its basic axioms was, "A straight line is the shortest distance between two points." What, asks Einstein, is a straight line, in fact? How do we test a ruler for straightness? By holding it up before the eye, and seeing that both ends and all intermediate points blend when we look along it—just as a carpenter sees if a plank is straight; just as a marksman sights along his rifle. This amounts to saying that a straight line is the direction in which a ray of light travels. Einstein had established that the course of a ray of light was bent by gravitation. This bent thing is not the straight line that Euclid had in mind.

Again, Euclid's postulate of parallels, "Through a given point there can be only one straight line parallel to a given straight line," does not apply to the actual universe, when the effect of gravitation on light is considered. Reimann's non-Euclidean geometry, with its axiom, "Through a given point there cannot be any straight line parallel to a given straight line," does apply to the universe. Two straight lines (or two luminous light rays) being in what (for each fraction of the rays) we may call the same plane, will become bent by gravitation. Since they do not coincide, they will be affected by gravitation in slightly differing degrees. Thus they will either meet, or will cease to be parallel, since they will no longer coexist in the same plane.

The universe, then, is not a universe of planes and straight lines, in the Euclidean sense; but a universe approximately Euclidean, in spaces remote from all heavy masses, and a universe warped and curved in the vicinity of stars and planets, the curvature increasing in proportion as we near star or planet. Reimann's geometry or curved space fits the actual universe far more than Euclid's classic geometry. A *geodetic* being one of the shortest-distance lines in the actual universe, now apparently straight in the Euclidean sense, now warped by the presence of a star's mass, we reach Einstein's law:

> Every moving body left freely to itself in the universe describes a geodetic.

Thus gravitation is no longer a force. The planets have curved paths because near the sun, just as in the neighborhood of every concentration of matter, the universe is curved or warped.

Is the universe infinite? In other words: if I go straight ahead, going on eternally, shall I ever get back to my starting point? Newton, bound by classic science, said, no; the universe is infinite. Einstein, in the light of the newer science, says, perhaps yes; the universe is not infinite, although it is not limited. A thing may be unlimited, without being infinite. A man may travel forever on the earth's surface, and never reach a limit; yet the earth's surface is not infinite. So rays of light may travel eternally around the unlimited, yet finite, universe. When we see a star, classic science told us the limitations of our own eyes as organs of vision; the newer science tells us that the ray of light from the star is as untrustworthy. It has not come straight to us; it may have wandered like a prodigal son, straying this way and that, lurching drunkenly near some vast starry mass, then, all repentant, with a face once thought innocent, sheepishly presenting itself to our eye. But now we know its face hides infinite wanderings, in a universe no longer infinite.

Ludwig Silberstein, using the formulae of Einstein, has computed the size of the universe as having a size no greater than 180,000,000,000 light years. This is the greatest possible distance between two points by the straightest line, which is one half of the total curved line of a ray of light encircling the universe. The straightest line in the actual universe is a closed curve.

To come back to our conceptions of space and time, in closing this survey of astronomy, taken as a whole, Einstein denies that absolute space exists, or that absolute time exists; the only reality, he says, is the space-time relationship, which he calls the Einsteinean *interval.* Hence his interpreters (as we shall learn in Book VI: *The Outline of Philosophy*), describe time as the fourth dimension of space. As Minkowski worded it,

> Space and time are mere phantoms. All that exists in reality is a sort of intimate union of these entities.

With this tremendous revision of our ordinary viewpoints, let us take a final glance at the earth, and then pass on to its restless child, life.

GEOLOGY

Geology (from Greek *Ge,* the earth, plus *logos,* a word or a science) is the science of the earth, one dark star among the sky's millions of stars. The earth is made up of three distinct parts,

1. An envelop of air, called the atmosphere.
2. A less extensive atmosphere of water, called the hydrosphere, or water-sphere, which, constituting oceans and seas, covers nearly three-fourths of earth's surface.

3. A globe, called the lithosphere, or stone-sphere, with an external solid crust and an internal nucleus, about whose true nature science is still ignorant.

The limiting height of the atmosphere is at some unknown elevation above 20 miles. Clouds are formed from clear transparent air by the condensation of the invisible watery vapor in it into numerous minute particles of water, ice, or snow. This results in partial darkness; prevents the solar heat from reaching the surface of the ground, and concentrates it on the upper surface of the cloud. Heated air has a tendency to rise, cold air to fall; when differences in pressure of air masses are added to the former tendency, we have the winds resulting. The formation of rain is the last step in the formation of a cloud. Rain and snow means that point of growth of the cloud particles which will not permit their being longer sustained by the air. Explanations of the formation of raindrops include (1) wind action in driving smaller particles together, (2) downward motion caused by change in temperature at nightfall, or in the shade, (3) the influence of electrical attraction, with some particles positive and some negative, (4) violent agitation of the air, due to cannonading or thunder, driving the particles together, and, most important, (5) Wilson's views that floating particles of dust act as nuclei in causing the formation of raindrops. The study of the various types of storms, hurricanes, typhoons, simoons, water-spouts, and kindred phenomena, as well as of prevailing winds and trade winds, is fascinating and full of intricate details.

Beneath the salt- and fresh-water hydrosphere we reach the lithosphere, divided into crust and interior nucleus. The high temperature of the interior is evidenced by volcanoes, or openings that give out hot vapors and molten stone or lava from reservoirs beneath the crust; hot springs, and the increase of temperature discovered in deep mines, tunnels, and borings. The constitution of the crust has already been stated, in our study of chemistry. The rocks of the crust are classified into:

1. Original or underived rocks, largely of forms of lava, called igneous or eruptive rocks. Lacking definite internal structure, they are called massive or unstratified, that is, not divided into layers. They probably underlie all other rocks.
2. Sedimentary or stratified rocks, including—
    a. Fragmentary rocks, disintegrated from previous rocks.
    b. Rocks deposited by chemical precipitation from water.
    c. Sedimentary rocks formed from the remains of plants and animals, especially in rocks of coral formation from sea-shells, and peat-bogs and coal, from plants and animals growing and decaying on the spot.

Sedimentary rocks laid down under water are spoken of as aqueous rocks, as opposed to igneous rocks, originating from a fiery condition. Those laid down by wind acting upon sand and similar substances are called aeolian rocks. The sedimentary rocks furnish most of the data for geologic history.

3. Metamorphic rocks, or rocks altered from igneous and sedimentary conditions, including especially the schists.

Earthquakes are caused by movements of the earth's crust; there are also slow depressions and upheavals, elevating or depressing continents, islands, and other land masses. The action of water in eroding land surfaces is a constant one, producing valleys, river beds, and, by deposit in the hydrosphere, river deltas, islands, and great extensions of the continental masses.

ADDITIONAL READINGS

ASTRONOMY. For a general dynamic study of the theme, *Astronomy: The Science of the Heavenly Bodies,* by David Todd (New York, 1922), is valuable. *The Stars,* by George F. Chambers (New York, 1909), is a readable account of the universe outside of the solar system.

EINSTEIN. The market is flooded with books upon Einstein and his discoveries. The one worthy book is the brilliant product of a French mind, *Einstein and the Universe,* by Charles Nordmann (New York, 1922).

III. THE ORGANIC SCIENCES

5. Biology

THE ORIGIN OF LIFE

We have traced chemical organization up through the colloid form, as exemplified in glue; we are now to take the chain of evolving matter a step further, into that stage called life. The problem of what is life brings up the matter of definitions. The important thing to remember is that nothing in the universe can be defined by limits; things can only be defined by centers. Thus noon is clearly day, and midnight is clearly night. But twilight, the insensible passage between day and night, that indeterminate period of dimming light, may be included as a part of day, or a part of night, or a part of both, or a part of neither, as you prefer. The definition from the center is easy; but there is a twilight zone, in which the one thing, day, graduates insensibly into the other thing, night; and there is no scientist who can say accurately when one ends, and the other begins. The most that can be done is to fix an arbitrary, conventional boundary, and say: Up to this second, day; after this second, night.

It is the same with life and lifelessness. Contrary to the holdings of those who seek to persuade men that life came by some special creation, and differs entirely from lifelessness, the reverse is true. Lifelessness merges and blends insensibly into life, just as surely as day blends into night. Once men were convinced that a cell, the lowest manifestation of life, possessed a nucleus, a nucleolus, and a cell wall. Then cells were discovered without a nucleolus. Soon cells were discovered without a nucleus as well. And now scientists have discovered cells—active life, in the form of active protoplasm, as in certain disease germs, for instance, typhoid fever germs—without even cell walls: just masses of colloidal liquid, yet possessing the essential qualities and attributes that we regard as indicative of life. Below these, without a break in the chain, are colloids not yet equipped with the two qualities differentiating life from lifelessness. Some scientists claim that protoplasm, the lowest form of life, has been artificially manufactured in the laboratory. If it has not been so manufactured, it will not be long before it is so manufactured, in all scientific probability. Life and lifelessness are as close to one another as the corn seed and the sprouted grain, as the sandstone and the powdered sand made from it.

What are these two qualities, differentiating lifelessness from life? They are, biologists say,

1. Motility (the power of spontaneous mass motion), and
2. Irritability.

These two may be, in their last analysis, one. The evolution of a planet, like our earth, from the incandescent gaseous or planetesimal multi-solid state into the present mono-solid state, produced water occupying the cavities of the surface, condensed from water vapor or steam, and an atmosphere of oxygen, nitrogen, carbon dioxide, and water vapor. These are the principal materials out of which the biotic or life products are formed.

There is everywhere a universal chemism, or chemical change of substance. Within a narrow range of temperatures, chiefly between the freezing and boiling points of water, with its maximum in the central portion of temperature separating them, this chemism passed into zoism, or the production of life, during the cooling of the planet. This actual beginning took place when temperatures were much higher than they are now even in the tropics. Of this beginning of life, Haeckel says, we are as sure as we are of the principal facts of geology. Whether it is still going on we are not so sure; it may have required higher temperatures and different conditions than now exist, to originate an organic world. Thus protoplasm, which Huxley calls "the physical basis of life" was formed—so simple, from the biological standpoint, that it can scarcely be called organic; so complex, from the chemical standpoint, that it cannot be classed among inorganic chemical substances. Protoplasm is the real twilight zone between lifelessness and life; it is the link, no longer missing, between the granite stone and man.

The shore sea is the mother of all life. Prior to the appearance of protoplasm, all spontaneous activity had been intra-molecular, or within the molecule. Motion was confined to the elements, or chemical units, of bodies. Both lifeless and live bodies are capable of spontaneous intra-molecular motion; only life is capable of spontaneous mass motion, which is called motility. This appears first in protoplasm. Lester Ward suggests that the difference is caused by the relatively enormous size of the molecules of protoplasm; and points out that the isomeric forms of the next most complex chemical substances, the colloids, approach the property of motility. Zoism, or life activity, is a synthetic creation of chemism, or chemical processes.

We have called the other property of life irritability; from this springs feeling, and out of feeling comes awareness or consciousness. The elements out of which feeling grows are undoubtedly present, even in protoplasm. This substance, growing out of the soft, semi-aqueous, viscid and gelatinous colloid form, must be so unstable that it can perpetually renew its constituent particles, exhausted every moment by the still dominant chemism involved in its activities. The problem was to preserve the form, during this constant transformation of the substance. The least concussion from without, or disturbance of the medium, threatened to destroy the entire structure thus built up, and cause its return to the chemical kingdom. The frail structure must also possess the power to appropriate fresh material, needed to supply the losses due to the breaking down of the complex molecules, and their return to the chemical state. The two great early necessities were, to supply the waste involved in metabolism, and to escape the destructive influences of the environment. The faculty of feeling just satisfied the conditions of the problem. Feeling furnishes an *interest*, based upon *agreeableness* and its opposite. In the next section, psychology, we shall see how a great thinker traces this to its ultimate root. Out of this interest-engendered feeling grew the subconsciousness, and then the consciousness.

Most complicated of the life substances are animals; these, in the main, feed upon plants. Plants, in their turn, feed upon water, carbon dioxide, and the nitrogenous salts. Where do they get their nitrogenous salts? From the bacteria. What do the bacteria live upon? A few simple minerals. The preparation, by bacteria, of the chemicals of the earth for higher forms of life may have taken, Geikie thinks, 400,000,000 years.

BACTERIA

Bacteria are the middlemen of the nutritive chain. In one gram of soil, Jordan says, these bacteria have been found:

Peptone-decomposing	3,750,000
Urea-decomposing	50,000
Denitrifying	50,000
Nitrifying	7,500
Nitrogen-fixing	25

It was once held that bacteria came by spontaneous generation; now the contrary has been established. Scientists classify some bacteria in the vegetable, and some in the animal kingdom. The bacteria which cause putrefaction or decay were removed by botanists from the group of animalcules, or little animals, into a family of plants akin to the delicate water weeds, the Oscillatoriae; the bacteria called Rotifera are classed with the group of Annulose animals. Thus plants and animals both show descent from the primitive bacteria.

The Bacteria, in general, are now recognized as a group or class of very small rod-like, spherical, or filamentous (hairy) aquatic plants, allied to the common blue-green water-plants called Algae or pond-scum. They multiply by splitting, or transverse fission (cross division). They occur usually as swarms of many millions of small separate rods. Each rod is usually 1/50,000 of an inch in width, and 1/25,000 of an inch in length. They may be seven or eight times larger than this, or at times much smaller; their usual name is *bacilli*. When they split into the spherical or *coccus* form (micrococci, small spheres) they are in process of reproduction. The rate of growth of bacilli and micrococci is very high. The common hay bacillus (found in infusions of hay) doubles in length and divides every half hour. One such bacillus, under favorable circumstances, would produce 1,024 bacilli in 5 hours, or over 1,000,000 in 10 hours, and millions of millions in 24 hours.

They are found either actively darting in liquids (the swarming phase) or motionless (the resting phase). Their movement is due to the presence of delicate threads or hairs of protoplasm, which keep up a lashing movement; such threads are called *cilia*. Upon entering on the resting phase of life, the bacteria shed these cilia. Each little individual coats its body with a thin film of jelly, which may spread into a thick gelatinous mass in which the bacteria are growing. Neither mating, nor the production of male and female spores, has been observed in bacteria; but they do at times produce stato-spores, reproductive spores of an enduring character. The bacteria have no true cell-nucleus; they may survive at very low temperatures, but as a rule high temperatures are fatal.

The bacteria generally get their food by the aid of certain *enzymes* or ferments (compounds of carbon, hydrogen, oxygen, and nitrogen) which act as catalysts, or neutral bodies speeding up the process of chemical action. The bacteria, having no stomachs, cannot get their food into them; but they can get into their food, and can break it up by the agency of these ferments, rendering it soluble, and then soaking it up into the bacterial body. Bacteria of putrefaction or decay work successively, in relays of bacteria with different roles in the process. If it were not for these bacteria, undecomposed dead bodies, leaves, branches, and the like would pile forever upon the surface of the ground, with all their valuable substances, so necessary to other life, forever stored in a useless form.

Science has not yet progressed far enough to describe the evolution of the different types of bacteria, or even to classify them clearly. This has progressed to the tabulation of more than a thousand species, and thirty genera or larger classes. In addition to putrefaction, bacteria are responsible for the formation of vinegar, acids from milk and sugars, butter, cheese, tanning of hides, nitrogen-fixing in the soil, certain diseases, and many other activities. Among their byproducts are heat, and, at times, light, in the form of phosphorescence, cold light, or light without heat. If protoplasm is the physical basis of life, its first utilization in bacteria furnishes the necessary foundation for all subsequent alterations, called by men higher. Among the more powerful microbes are the bacillus botulinus, a microbe resulting from the eating of putrid flesh or fish. This germ is so deadly that a single drop of poison made from it, its discoverer said, would be enough to kill every human being on the whole earth. The discovery of an incredibly small bacteriophage, or "bacteria-eater," by d'Herelle of the Pasteur Institute, announced in 1917, reveals that it is possible that certain potent bacteria may be isolated to combat the more virulent diseases.

BOTANY

Botany is that division of biology which deals with the vegetable kingdom, or plants. Plants today may be studied by direct observation of the living organisms; plants of the past, by their fossil remains in the rocks. If a twig or a leaf drops into shallow water, it ultimately sinks. Given a clay or mud bottom, and a covering of mud or silt brought down by the stream, the leaf or twig will be buried, with every slightest depression filled in. If then the buried object is raised, so that it dries and splits open, we find a perfect impression of the veins and other outward characters of the leaf or twig etched in the clay. If opportunity is given for this clay to harden into rock, we have what is called a *fossil.* The early life history of our globe has been reconstructed by science from such fossil remains.

Science today divides plant life into four classes:

1. Thallophytes (including bacteria, algae, fungi).
2. Bryophites (including mosses and *Hepaticae,* or liverworts. *Worts* is the Anglo-Saxon word meaning plant).

3. Pteridophytes (including ferns, club-mosses, and horse-tails).
4. Spermatophytes (including all the flowering plants).

The first three classes are collectively, though illogically, grouped together as the non-flowering plants, or cryptogams (hidden-mating plants); the last class is called the flowering plants, or phanerogams (open mating plants).

VEGETATION DURING THE EARLY AGES

The first plants to appear (as the lowest strata, or layers, of the fossil-bearing rocks show) were the thallophytes, including bacteria, as we have already seen, and also fungi and algae, similar to green pond-scum today. The world knew no trees, vines, or flowers; no mammals, birds, or fishes; no insects or lower forms of animal life, at this early stage. The land was bare of life; along the sterile shore life commenced as green scum, of one-celled and then multiple-celled bacteria and algae. Later came more complex algae, akin to our sea-weeds; though most of these were apparently fresh-water plants. This long pre-Cambrian period has been called the Age of Algae.

The first land-dwellers were amphibious plants, "with one foot on the land and the other in the water." The first of these belonged to our living family of club-mosses, like the ground pine found, a few inches high, trailing in forests of the New England and Middle Atlantic states, and elsewhere. Yet these reached to vast tree-like structures, so well preserved in the fossil records that their internal organization and spore-bearing characters are all recognized. Forms of life die slowly; they taper off, rather than wholly disappear: as the tiny lizards today are vestiges of the great saurians or lizard giants of the Age of Reptiles, and as the tiny club-mosses today are vestiges of the vanished club-moss trees.

During the Carboniferous Period, when the earth's coal supply was being deposited in the form of vegetable matter, the earth's climate must have been nearly uniform and seasonless; fossil remains of these strange plants are found throughout the world. This period shows the earth covered with great ancient forests, peopled with queer animals long since extinct, and with dragon-flies with a wing-spread of two feet or more. Club-moss trees, vast horsetail trees (their remains being the low swamp horsetails still found), great cycads (kin both to the ferns and the sago palms), and, highest of all, the *Cordaitales,* ancestors of our modern cone-bearing evergreens, comprised the vegetation. The cycads, as in the case of the sago palm today, possessed a male fertilizing element capable of movement, as in the male fertilizing elements in the cryptogams or non-flowering plants; yet the cycads were true flowering plants, which bore cones. In these and the Cordaitales we see an experimental breaking-away from the spore methods of the cryptogams, into the seeds that mark the flowering plants. Most of the plants were flowerless; these two families bore flowering cones, with huge quantities of pollen, which is found preserved today with the preserved remains of the extinct forests. Both combined to make the coal which is today much of the world's fuel.

In the case of animal life, the definite procession of the forms of life has been discovered; in the case of plants, science can not yet speak with certainty upon the order of development of the various forms, even among the flowering plants. This uncharted territory may at any time be successfully explored by science.

In the upper or last strata of the Carboniferous Era, one interesting tree, the gingko or maidenhair tree, appears frequently as a fossil. This tree just missed extinction recently, being discovered alive only in temple yards in China and Japan. Today it has been spread over the civilized world. It and the sago palm, alone of flowering plants, have male fertilizing cells capable of movement, in common with most of the lower cryptogams.

After the Carboniferous Age, the climate changed; vast mountain ranges were slowly upthrust, and the continental glaciers began their slow southward encroachment. Club-moss and horsetail grew small; the Cordaitales gave place to trees like our yews. The first plant with a large showy petal, the magnolia, appeared. Such plants developed contemporaneously with the growth of nectar-bearing insects, by what is called nature's principle of adaptation. Along with the magnolia came such trees as the tulip tree, sassafras, and poplar. All these fossil remains are from the northern hemisphere, which may have been the cradle of the flowering plants, now known to number more than 150,000 species. Soon herbs began to be common, especially the grasses, sedges, and such monocotyledonous plants as the palms. A monocotyledonous plant is one which sends up one leaf from the seed, instead of two as in the case of dicotyledonous plants.

THE PARTS OF A PLANT

The parts of a plant are roots, stem, leaf, flower, fruit, and seed. Roots serve the double function of acting as anchors, or holdfasts; and of securing food for the plant. Certain plants as high as the flowering plants have no roots, but attach themselves to other plants, literally stealing their food from living relatives. Among such plants, or parasites, is the Christmas mistletoe. Many annuals, or plants living only one year, and biennials, or two-yeared plants (as the fringed gentian) have fibrous roots, usually near the surface. Among perennials, which live many years (such as the dandelion) the root is deeper, and forms what is known as a taproot. In shrubs and trees the taproots are harder, woodier, and often penetrate to great depths. Some roots, like those of the hickory, go straight down; others, like spruce and hemlock, spread great distances through the soil in search of food. The woody part near the tree is almost dead; at the extremities of the roots are the root hairs, which are the food-gatherers. The tips of roots and rootlets are covered with a root-cap, a tiny battering-ram which pushes through the soil. Other roots, especially in certain biennials, swell to thick masses, as the sweet potato; one morning glory has a perennial root weighing as high as fifty pounds. Carrots, turnips, rutabagas, beets, and parsnips are similar examples, whose purpose is to store food for the plant. The roots bind the soil together on steep slopes; when fire or careless lumbering stops this process, the soil is washed away, leaving the desolation of bare rocks where life had been.

Some plants have aerial or air roots; in many orchids, and other plants, the roots live wholly in the air, the plant being fastened to a tree, or even along a telephone wire. The tomato, and other plants, at a point of injury produce extra or adventitious roots. The banyan tree (a relative of the fig) from India, and the mangrove tree, send down roots from the air, which unite with the soil, and form new tree-boles or stems. One banyan tree, starting from a single trunk, has spread until it is over 2,000 feet in circumference, has 3,000 trunks, and once sheltered 7,000 soldiers.

The sweet potato is a root; but the white or Irish potato is not a root, but a stem. Its eyes are buds, and buds grow only on stems. The chief use of the stem is to support in air the leaves and flowers that come from the buds. A swollen root is called a tuber; one lengthened out, as in the iris, is called a rootstock. Onions, jack-in-the-pulpits, and similar plants, have bulbs, with roots below and buds or shoots above, which no true root ever has. Stems, in addition to offering support, also carry sap and certain foods from the roots to the upper stories of the plant. They range from the simple stem of daisy or goldenrod, with a thin hard outer covering and pith within, to a tree, with its heartwood, practically lifeless, and its sapwood near the bark, separated from it only by the bright, green, living layer, the *cambium,* renewed each year, and whose successive rings indicate the age of the tree in years.

The giant redwoods or sequoias of California are among the oldest and most permanent of living things. The tree called "General Sherman" is nearly 4,000 years old; it was 2,000 years old when Caesar landed in Britain; 1,000 years old when Solomon built his temple of the great cedars of Lebanon; and a sizeable tree when almost forgotten Hammurabi promulgated his code of laws in early Babylon. It is 270 feet high, and 35 feet in diameter. There are Pacific Ocean seaweeds with stalks over 500 feet long, and rattan palms of India measuring over 700 feet above the treetops.

The great goal for such plants is to get as much sunlight as possible; dark tragedies mark every quiet greenwood, with murders by strangulation and starvation constant occurrences.

A strange environment produces strange results. The waterless desert makes the cactus lose its leaves; its thickened green stem performs the functions of leaves, and acts as a storage for water. A single cactus has been found with more than 125 gallons of water stored up.

Some leaves, by adaptation, procure food for the plant, as in our common pitcher plant, whose cups catch, hold, and digest insects; and the sticky-haired sundew, which traps insects in its hairs much as flypaper holds a fly. The Venus Flytrap is an even more elaborate insect-catcher. Certain leaves, as in the century plant, also store water.

FLOWER, FRUIT, AND SEED

Only in the fourth form of plant life, the spermatophytes, do we find flowers. Where does a flower come from? Simply by adaptation of a group of leaves: much as a group of Italian peasants may become adapted into a grand opera troupe. Starve the singers, and they revert to peasants. Starve the flower in process of adaptation, and each part reverts to a little leaf. Thus every field of goldenrod and black-eyed Susan holds hundreds of plants whose flowers, often due to the bite of some insect, fail to develop into flowers, but revert to clusters of strange tiny green leaves.

Below the flower we may find smaller leaves, altered in color, called bracts. Above these are leaflike sheaths, often green, called the sepals; the group of sepals is called a calyx. Still higher are the more highly-colored sepals called petals; their joined group is called the corolla. Within the petals occur the male stamens, bearing an anther at the top which contains the fertilizing pollen. Usually in the middle of the flower there is another organ, often swollen at the base, called the pistil. It is the female organ, at its base an ovary, leading to the slender style, with a thickened or branching tip called the stigma.

Some flowers lack petals, as the buckwheat, where the colored calyx replaces the petals. Others have neither calyx nor corolla, as in the sycamore tree. In some plants certain flowers have no stamens, and are called pistillate or female flowers; certain others have no pistils, and are called staminate or male flowers. In such plants, as walnut and hickory, where the sexes are on different flowers, the plants are said to be monoecious. Where the sexes are on entirely different plants (as in practically all willows) the plants are said to be dioecious. These have pistillate or female plants, and staminate or male plants.

The fruit is anything in which, or upon which, a seed is developed or ripened, quite without regard as to whether it is edible by man or not. The fruit is practically always a development of some part or modification of the ovary, or the upper end of the flower stalk upon which it rests. Among fleshy fruits, the berries (such as orange, tomato, grape, gooseberry, and cranberry) are a direct development of the ovary, often a mere swelling, with sometimes the adhering calyx, and containing the seed. In apples and pears, known as pomes, the fleshy part is a development of part calyx and part the receptacle upon which the ovary is supported while still in the flower. The ovary of these plants is the parchment-like interior which contains the seeds. Plums and cherries, having a single stone, instead of numerous seeds buried in the flesh, are called drupes. In the watermelon, pumpkin, and related plants, we have the pepo; all of it, including the hard rind, is transformed ovary and calyx completely incorporated. In many plants there are several ovaries, which develop into what are called aggregate fruits; for example, blackberries, mulberries, and magnolias.

The purpose of the fleshy fruit is to secure seed distribution. Capsules and legumes (as peas, for instance) split and eject their seeds; violets and jewel-weeds open explosively and shoot their seeds a considerable distance. Other dry fruits cover their seeds with prickles or barbs, which become attached to passing animals, and are carried from place to place. Other fruits have wings, like the maple, the ash, the dandelion, and the daisy. In severe storms certain winged seeds have been known to fly hundreds of miles.

The final stage in the development of plants is the seed. These vary in size from the mustard seed to the coco de mer, from the Seychelles Islands, often weighing more than fifty pounds. Seeds have within them a tiny plantlet folded and ready to grow, when the seed splits to release it; as well as food to support the young plant until its roots have begun to function.

In all net-veined leaves the young plantlet starts life with two leaves, or cotyledons; the group is called the dicotyledons. In plants with parallel-veined leaves the plantlets start out with a single cotyledon; the plants are therefore called monocotyledons. In only the pines, spruce, and a few other evergreens, the seedling plants have several cotyledons, and the group is known as the polycotyledons. All the flowering plants in the world belong to one of these groups.

LIGHT AND WATER

Examining the non-flowering plants briefly, the algae, since they have green coloring matter or chlorophyll, cannot live in the dark; hence they are not found in the depths of the ocean. Many are fastened to rocks, as in common types of seaweed. The Sargasso Sea, recently investigated by William Beebe, is composed of millions of these plants, torn from their rocky anchorages, and eddied into an archipelago of restless seaweed islands in mid-Atlantic. The common mushroom is one of the fungi. These have no green coloring matter, and always live in decayed vegetable matter, or inhabit living plants and animals, including man himself. An interesting partnership of thallophytes is the lichen, a composite organism consisting of an alga and a fungus living together in mutual aid. This process is called *symbiosos,* or living together.

The bryophites, mosses and liverworts, reproduce by means of a capsule containing spores, which are discharged and produce the next generation. Among the pteridophytes (ferns, club-mosses, and horsetails) the process of reproduction is even more complicated than in the case of the flowering plants. These produce spores, which in turn produce the thallus stage, from which, as we shall explain later, the new generation comes.

Light is essential to a plant's life. The leaf is the plant's factory for making food, with the chlorophyll as its factory hands. With materials consisting of inorganic substances received from the air and from the roots, including the nitrates made ready by the bacteria, the chlorophyll, by the aid of sunlight, transforms these into substances like starch and sugar. Nothing else in all nature can do this; without this faculty, which the commonest leaf possesses, the earth would be uninhabitable within a single year. The valuable substance, when winter comes, is withdrawn by the plant into the stem and roots, to be stored up for the next year's use; this causing the red, brown, and gold coloring of autumn foliage, since the green chlorophyll has been withdrawn. Among the constituents of chlorophyll are iron, oxygen, carbon, hydrogen, and nitrogen.

Water is essential to plant life. It keeps the stems of many plants rigid; and by its means the plant gets all its food. For no plant can eat solids; the plant must absorb solids in solution, by that strange process called osmosis, in which liquids pass through other bodies. The first step of the factory's operation is called photosynthesis, or combining by means of light—not yet fully understood by science. One of the byproducts of the manufacture of sugar is oxygen. The plant breathes in carbon dioxide, a gas poisonous to man, and ejected by man and other animals in breathing; and at the same time gives out oxygen, so essential to animal breathing.

A square yard of leaf surface produces one-third of an ounce of sugar in a day, or nearly three pounds in a single growing season. The same leaf surface withdraws from the air about two gallons of carbon dioxide in a day, or over 300 gallons in a season; approximately an equal amount of oxygen is thrown off in the same period. The number of square yards of leaf surface in the world is almost beyond computation.

Whether in light or darkness, the plant stem grows upward, the root downward—a property known as *geotropism,* or turning toward the earth. A plant always grows toward the light. Plants, especially trees, prune themselves. A sequoia forest may have its lowest branches hundreds of feet above the ground. Once these branches were just above the ground; but a branch not receiving sunlight is unnecessary, and the plant prunes off every branch which does not offer its leaves to the light. In many herbs the first leaves are short-stalked, and those below increasingly long-stalked, to allow sunlight to all. Nature has achieved a thousand adaptations of this principle. Certain plants regulate themselves by light, as the sorrels, the morning glories, and the four-o'clocks.

The pressure exerted by trees, to raise sap to their topmost leaves, is tremendous. At times plants develop strange methods of travelling, many of their seeds maturing perfectly after passing through the digestive tracts of birds and animals. There is said to be one pondweed incapable of germination until its seed has passed through a bird. The long migrations of birds are of incalculable value in distributing seeds. The winds, the tides, also contribute to this travelling of plants. When a plant meets a new environment, it has to fight the native plants for possession, much as the white men contested the Americas with the Indians. Thus the English plantain, a common weed, brought by accident to America, has spread over it; the Bouncing Bet, an English garden flower, and several Japanese day lilies, have overrun large tracts of the same continent.

REPRODUCTION AMONG PLANTS

The fertilization methods of plants is a study in itself. Certain plants may reproduce without mating, as in the leaf-plants on the life plant from Mexico, and the common begonia; and also the cuttings from the tips of strawberry runners, potato cuttings, and willow sprouts. Certain seaweeds have no other form of reproduction. The so-called gills of a mushroom shed its spores when they mature; it is not yet ascertained whether there are male and female cells or not. The spawn of mushrooms, purchased from seedsmen, has been produced without mating.

In the case of typical moss, as the sphagnum or peat moss, the antheridia or male organs have minute globular organs which are the male cells. Each of these has two tails; and, when the time for fertilization comes, these swim through some drop or film of water, tail first, toward the female cells. The fact that water is essential to reproduction points toward the beginning of all life, in water. The union of male and female cells results in the formation of a spore-bearing structure, from which the next generation results.

A common fern bears about 45,000,000 spores annually, only a few of which survive the perils of the environment. Nature's method is the height of wastefulness, until corrected by the late development of mind. With so many spores, space is a necessity; so the spores are hurled considerable distances by the spore-bearing mechanism, and the winds aid in carrying them further. To be of use, they must fall on damp ground. The spores germinate in damp soil; from them, plants so small as to be hardly visible, the thalli, form along the ground. The thallus develops a few bodies containing eggs or ova; the rootlike hairs develop globular organs containing the male cells. These are separated by considerable distances; neither wind nor insects can assist. But the male cells can swim, if water is present in small quantities, toward the female's bait, consisting of a mucilaginous jelly around the ovum; they complete the fertilization, and from this the young fern develops.

In flowering plants, the pollen, containing the male cells, is distributed by gravity (where the stamen's head is right above the pistil); by wind, as in the case of pines and grasses; or by insects, in countless cases. Nature has evolved intricate methods of securing this cross-fertilization, going to the extent of having the flower (as in the case of the magnolia) imprison the insect for a few days, until the petals wither, and release the insect, his body dusted with pollen. Some flowers, failing in cross-fertilization (or fertilization of an ovum from pollen from a different flower or plant) can fertilize themselves; the extreme reverse of this is in certain orchids, which die if the flower is self-fertilized. In water plants, similar intricate devices exist, such as male flowers on the bottom of the pond released for mating and suicide at the moment the female flower has uncoiled to the pond's surface. Other aquatic plants fertilize under water.

It is unnecessary to detail the numerous families of flowering plants. There are about 500 gymnosperms, which bear the ovules naked or enclosed between scales, as in the case of pines and their relatives; and about 150,000 angiosperms, where ovaries protect the ovules. Many families include herbs, vines, shrubs, and trees, all classified botanically within the same family. Perhaps the compositae or daisy family, with its socialistic union of countless flowers (each golden nodule in the daisy's center being a complete flower) and its perfection in schemes for seed distribution, is highest among the flowering plants.

The difference between a shrub and a tree is commonly misunderstood. It is not a matter of size. Wherever a ligneous-stemmed or woody-stemmed plant normally sends up one trunk or bole, as in oak and pine, this is a tree; where it normally sends up many, as in the case of willows and mulberries, it is a shrub.

Saprophytes are plants living on dead vegetable matter; many orchids, and the common pallid Indian pipes in northern family, come within this group.

The nervous systems of plants are most strikingly exemplified in such sensitive plants as many mimosas, whose leaves close up at the touch of a finger.

The largest flower in the world is the Rafflesia Arnoldii, discovered in Sumatra in 1818, having no stem and no leaves, but a gigantic flower nearly nine feet in circumference. The flower is a parasite on certain tropical plants related to the grape; the sticky seeds are carried on the hooves of elephants and other animals, and only grow if the tissue of the prospective host is bruised or otherwise exposed.

ZOOLOGY

Scientists divide animals into 11 major classes. The relative importance of man and the other higher animals will be understood from its position in the following list:

- I. Protozoa. Simple one-celled animals, as ameba, paramecium, and the plasmodium of malaria.
- II. Porifera—pore-bearing animals, including all sponges.
- III. Coelenterara, including jellyfish, sea anemones, and most corals.
- IV. Flatworms, including tapeworms and liver flukes.
- V. Roundworms, including hookworms.
- VI. Wheelworms, mainly microscopic animalcules.
- VII. Echinodermata—spiny-skinned animals, including starfish, sea-urchins, and sea-lilies.
- VIII. Annelida—ringed animals, such as earthworms and leeches.
- IX. Arthropoda—joint-legged animals, including centipedes, lobsters, crabs, the spider family, and insects.
- X. Mollusca, or "soft" animals, such as snails, oysters, and the octopus family.
- XI. Cordata, or animals having a notechord, or internal axial basis for a skeleton. There are five classes of these:
    - 1. Fishes.
    - 2. Batrachians—amphibia, or dwellers on land and water, such as frogs, newts, and salamanders.
    - 3. Reptilia, such as turtles, snakes, lizards, and alligators.
    - 4. Birds.
    - 5. Mammals—warm-blooded animals that suckle the young. There are 11 orders of these, including:
        - a. Monotremata, or egg-laying mammals, as duckbill and spiny ant-eater.
        - b. Marsupials, carrying the immature young in a special abdominal pouch, from which the young are suckled—including kangaroos, wallaroos, wallabys, and opossums.

c. Edentata or toothless mammals—sloths, armadillos, and hairy anteaters.
d. Cetaceans, as whales and dolphins.
e. Sirenia, as sea cows.
f. Ungulata or hoofed animals: horses and rhinoceroses, sheep, camel, deer, pigs, and elephants.
g. Rodentia, or gnawers: rabbits, squirrels, porcupines, rats, and mice.
h. Insectivora, or insect-eaters: moles and hedgehogs.
i. Chiroptera, or hand-winged animals, as bats.
j. Carnivora, or flesh-eaters: the cat family, dogs, bears, seal, mink, etc.
k. Primates, the first, or leading order: including lemurs, monkeys, anthropoid or manlike apes, and man.

No such evolutionary order has yet been worked out for the plant world.

THE INSECTS

That subbranch of the IXth class, the Arthropods, known as the insects, includes approximately 450,000 different species. The complexity of the facts of zoology appears from this one statement. Each of the 450,000 species is entitled to at least a complete volume. In such a tremendous wilderness of details, we can give only outstanding facts, leaving to the specialist the study of each detail. Insects pass through numerous stages of development, the sizes of the stages differing greatly. Thus the weight of the minute larva of Cossus cossus, one of the moths which lives for three years, is only 1/72,000 of its weight when grown. This is as if a man, grown from a baby weighing 10 pounds at birth, should not stop with the maximum human weight, that attained by Daniel Lambert, of Leicester, who died at 40 after reaching a weight of 739 pounds; but should grow larger and vaster and fatter, until he smashed down the scales at 720,000 pounds.

The social organization of many of the insects is more specialized, often in a joyless and hideous way, than that of any other animals. Thus the termites, often miscalled "white ants," have three castes of purely reproductive termites, with differing roles in mating; as well as vast wingless kings and queens. There are also sterile castes of soldiers and of workers. Each colony also contains members of other insect families, living with them and contributing to the colony's welfare. Some of their colonies, in Africa and Australia, are housed in mounds of earth, reaching 20 feet in height above the ground. The queen, of gigantic size, wingless, her diet chewed up for her by others, so that in the end her jaws degenerate, can lay 4,000 eggs in 24 hours. The colony includes "fungus-gardens," tended by the workers, and used also as nurseries for the royal young.

Certain dragon-flies attain a speed of 60 miles an hour. Among the aphids, or plant lice, certain species attain as high as 21 different forms during the life cycle; that is, 21 apparently different forms of animal life are all the same little animal, wearing the successive bodies and appearances of its different manifestations. There are more than 80,000 species of the lepidoptera (butterflies and moths), that group in which coloration has reached its most brilliant specialization. The fact that the common worms grow into the gorgeous butterfly or moth strikingly impresses man's imagination; the destructive nature of many of this family is known to her cost by every housewife, and is a constant annoyance to every grower of trees subjected to the ravages of these insects. The largest family in the insect world is the coleoptera, or beetles, with 180,000 described species. The sacred scarab of the ancient Egyptians is among these, as is the boll-weevil immortalized in the Negro folksong.

The enormous order of hymenoptera (ants, bees, wasps, etc.) comprises 60,000 species. In the case of the strange fig insects upon Smyrna figs, the male emerges first, and fertilizes the female while she is still buried within the galled flower of the fig. Galls are growths upon plants, caused at times by the injuries committed by these and similar insects.

Among the 3,500 species of ants we find the highest expression of polymorphism, or development of the species into differing specialized forms. No less than 29 different types of animals differing bodily have been recognized as the 29 different stages of the same ant. The amazing nuptial or mating flight of ants, the elaborate ant villages, their utilization of insects of other species (crickets, beetles, and ant-cows or aphids), and indeed of ants of other species, including at times actual slavery of groups of ants, make them an astonishing group of living beings.

The bees include such diverse creatures as the gigantic carpenter bees, capable of boring into wooden beams; and the hiving honey bees. Their swarms include as many as 80,000 workers. The nuptial flight of the queen bee, with the mating with her male consummated in the high thin atmosphere where alone it can take place,—a mating which tears from the male his sexual organs, and leaves him to plunge to death far below,—is one of the most absorbing stories in all science. The annual massacre of the males or drones by the workers is more drastic than any human massacres.

The diptera, the true flies, produce those larvae or maggots which consume decaying animal and vegetable matter. The strange multiple-faceted compound eyes, giving the insect brain thousands of images of the object seen, is another amazing feature of this form of life.

The tremendous leaps achieved by many insects mark the preliminary stage of flying; and this reaches such a high excellence that it ranges from a butterfly's 9 strokes of the wing in a second, to the bumblebee's 240, and a fly's 330 wing-strokes a second. The rapidity of this movement produces the humming sound, or buzz, so familiar.

FISHES, REPTILES, AND AMPHIBIA

The story of the fishes, reptiles, and amphibians contains material as amazing as the story of the insects. The scientific classification of fishes is complicated, and valuable only to specialists. Many fishes of the open sea are able to skim along the waves, when pursued, or may even sail down the wind like an albatross. These are the so-called flying-fishes. The depths of the ocean contain strange deep-sea fishes, grotesquely shaped, and often self-luminous with that same cold light that illuminates the glowworm. The teeth of many of the deep-sea fishes, living in an environment lacking plants, indicates their fiercely carnivorous habits. There are many fishes that are adapted to the shallow seashore waters, such as sand-eels and sticklebacks. The fishes of rivers and fresh-water lakes form other groups, all cold-blooded and almost all egg-laying.

The third great era in the world's history, as the fossil records indicate, was the Mesozoic, or the Age of Reptiles. The pleisosaurs reached a length of 50 feet or more; the brontosaurus was 80 feet long, stood 16 feet high at the shoulder, and weighed 70,000 pounds, or as much as 70 saddle horses. There were also strange pterosaurs, or flying lizards, some measuring 20 feet from wingtip to wingtip. In this period appeared the first birds, their skeletal remains showing clearly their descent from reptiles. They were covered with feathers, but had long jointed lizard-tails, and jaws with reptilian teeth. The first reptile-like mammals also appeared in this period. Today, the reptiles have shrivelled to the vestiges of snakes, great and small, and lizards, the longest of them hardly 6 feet from head to tailtip, and most of them merely tiny scamperers along walls or under dead leaves.

Amphibians had their golden age in the Carboniferous period, when the coal-measures were being formed. Emerging from the fishes, the non-toed paired fins of fishes were replaced by limbs with fingers and toes. The tongues of fishes lack muscles entirely; the tongues of the early amphibians slowly acquired muscles. The voice appeared for the first time; it was first used as it is used today in frogs and toads, as a sex-call. The voice of the male frog is often far better developed than that of the female.

THE BIRDS

As the reptile scales altered to feathers, the leaps of the early birds altered to glides, and these to true flights.

Strangely enough, the priceless gift of flight was not always preserved. Among extinct flightless species are the Moa of New Zealand, an ostrich-like type standing 12 feet in height; and the Aepyornis of Madagascar, perhaps the origin of the imaginary Roc in the Arabian Nights Tales, remains of Aepyornis eggs showing that these reached a length of more than 13 inches, with a breadth of 9½ inches. The Dodo was another flightless bird, about the size of a pigeon, which survived in Mauritius until it was exterminated, in the 16th century, by hogs which Dutch sailors imported into the island. The living ostrich tribe—including the rhea of South America, the emu and cassowary in Australia, and the small kiwi of New Zealand—is composed of running birds, lacking power of true flight. Neither have the penguins this power, although in their case the wings have become adapted for swimming, the penguins returning to their rookeries over hundreds of miles of ocean, until colonies as large as 750,000 have been observed. Mother and father birds, and even the large number of barren birds living in the community, share the task of incubating the eggs. The weight of the adults reaches 90 pounds; and any solitary penguin chick is at once subjected to a football rush of all the nearby adults, at times a formidable assault, leaving the young chick bruised or dead upon the ground.

Birds, like mammals, are warm-blooded. Their flights range from soaring with apparently motionless wings, for hours at a time, to the swift wing-motion of the humming-bird. The highest speed observed among birds is among certain swifts, which may well reach 100 miles an hour. As to altitude, instances have been recorded of birds 15,000 feet high, though such instances are rare. Some birds are comparatively solitary; most of them are gregarious, possessing the flock instinct. Among strange adaptations is the habit of American burrowing owls of living in friendliness with prairie dogs in the holes of the latter; as in New Zealand the petrels and Tuatera lizards share the same holes amicably. Strangest of all is the ruddy kingfisher of Borneo, which nests in the hive of a particularly vicious bee. The cuckoo's habit of laying its eggs in the nests of smaller birds, who hatch them for the lazy mother, is well known. The inconsiderate mother also steals at the same time an egg from the foster-nest, eating it or dropping it. The young cuckoo, with further inconsiderateness, pushes the small birdlings out of the nest, until the bewildered parents are left with only one birdling to feed—but with an appetite incredibly voracious.

Perhaps the migrations of birds are their most obscure activity. It seems increasingly clear that this is the survival of an old habit, once necessary, but now rendered often unnecessary by altered conditions of climate and other facts of the environment. The ability of birds to find their way thousands of miles, often back to the same tree—which may be tested by affixing metal rings to the legs of the birds one year, and observing them the next—much of this being in night flights, is an uncanny example of animal instinct. Birds are noted for their exquisite songs, in many instances, the sound coming from the vocal cords situated at the foot of the windpipe, rather than from the top of the windpipe, as among mammals.

As in the case of fishes, the scientific classification of birds has altered constantly in the last two centuries, and is today highly complicated. Among prominent orders are the gallinaceous birds, such as quail and partridges; the raptores or preying birds, including the owls; the pici, or members of the woodpecker family; the passeres, or perching birds, including sparrows, wrens, warblers, and jays; beside many other orders.

THE MAMMALS

The various divisions of the mammals have already been listed. The field of organic evolution, leading through the mammals to man, is the most bitterly debated field of biology. There are now no important missing links in the life chain. In some cases, as in the evolution of the horse, every slightest link is present. From the little 4-toed eohippus (dawn-horse) found in the Eocene strata of Wyoming and New Mexico, standing 12 inches high at the shoulders, down to the modern horse, we know every stage. The ancestor of the eohippus, the 5-toed hyracotherium, has been discovered in early Eocene rocks in England—rocks 40,000,000 years old. The mesohippus, in the Oligocene period, was a step upward, 18 inches in height, with only 3 toes on its front feet. Moreover, the animal walked mainly on its middle toe. In the Miocene, we find larger descendants of the mesohippus, including the merychippus, still with 3 toes, but with the outer two of these unable to touch the ground. The Pleistocene, or glacial age, yields horses similar to the wild mustang roaming the western plains today—horses standing 15 hands high. In America and Europe, these apparently disappeared; in Asia and Africa they were preserved, and from these two stocks our modern horses have sprung. Thus the facts of evolution are clear, not only in the case of horses, but in the case of the great apes and man. The scientific problem then became, how did evolution operate, to alter species in the ways that life has altered?

The six classic explanations are,

1st, the theory of environment.

By this, plants and animals were taken to be very sensitive, and moulded by their environment as a potter moulds clay. Once ably defended, few hold to this idea today.

2nd, use and disuse.

Lamarck, the great French naturalist, first offered this as the explanation of the how of evolution. According to this, organs are developed by use, and degenerated by disuse. This called for the inheritance of acquired characteristics, like the extra strength in a blacksmith's arm, and the weakness in an invalid's body. Thus Lamarck explained the giraffe's neck, as evolving from the normal-lengthed neck of a grazing animal into the upward-stretching neck of an animal forced to crop sustenance from tree leaves. The degeneration of serpents' legs would come from the environment consisting of low caves, which alone would furnish safety to the reptiles; with subsequent degeneration and disappearance of the legs. But this theory depends on the inheritance of acquired characteristics; and the bulk of the evidence is against such inheritance. Chinese women have bound their feet for centuries; but the feet of Chinese babies show no effects of this. Jews, in spite of centuries of circumcision, are born foreskinned like the men of other races.

3rd, natural selection.

This is the theory often referred to as Darwinism, since Charles Darwin was the first formulator of it. This theory is based upon the prodigality of nature's production of offspring. Yet death is the rule, and survival the exception; this Darwin found to be the key of the problem. No two of the countless offspring are exactly alike; the victors in the struggle, he concluded, must be those whose slight variations rendered them more fit to survive than their fellows. This Darwin called the struggle for existence, and the survival of the fittest—the natural selection of those plants and animals best able to meet living conditions. Thus Darwin would explain the long neck of the giraffe by nature's inexorable killing off of all short-necked giraffes, generation after generation, until only the tallest survived; the average of each generation being constantly longer-necked, and the variations above this average constantly lengthening the neck.

One of the most amusing illustrations of the intricate working out of the problem is Huxley's famous demonstration that the amount of red clover in England is directly dependent upon the number of old maids in rural districts. Red clover is fertilized by bumblebees. The field mouse is the bumblebee's chief enemy. The cat, tended chiefly by spinsters, in rural communities, is the field mouse's chief enemy. Carrying this a step further, the amount of red clover determines England's production of good beef; and England's brawn is built upon good beef. Thus the strength and prowess of the nation may be said to be intimately connected with the number of spinsters in rural neighborhoods. Man's own artificial selection of domestic plants and animals furnishes ample corroborative proof of this theory.

4th, the mutation theory.

Hugo de Vries, an eminent Dutch botanist, promulgated the theory that changes might come, not from a slow accumulation of alterations by natural selection, but from sudden leaps and bounds in the process. Radical and conspicuous changes, like the appearance of one hornless bull in a herd of hundreds, are called mutations. This theory has much support today, but has not displaced the Darwinian theory in the minds of thoughtful scientists.

5th, the isolation theory.

This would explain evolution by accidental isolation of groups of animals, with an accidental preponderance of some trait in the individuals isolated. This has not been widely accepted.

6th, the theory of hybridization.

This explains alterations as due to the admixture of individuals of differing species. Sometimes the result is infertile, as in the case of a mule; at times the offspring is fertile. This theory clearly can not account for many of the main facts the evolutionists adduce.

THE STAGES OF MAN'S EVOLUTION

Haeckel has given the 26 stages of man's ascent from the first living matter:

1. The simplest one-celled animal, without a nucleus, like the Monera.
2. The nucleated cell, like the ameba. The human ovum does not differ essentially from this.
3. A synamebium, or community of ameboid cells.
4. The synamebium is converted into a hollow ball filled with liquid, the walls composed of a single layer of cells. These often develop cilia, or hair-like appendages permitting locomotion. The common freshwater volvox is an example.
5. The larval form gastrula, or the volvox turned in upon itself to form a double-walled cup.
6. The free-swimming flatworm, a flattened sac with only one opening in it. The free-swimming ciliated worm convoluta is near this type.
7. The formation of a vent or anus, and the beginning of a cavity between the gut and the body wall.

8. A primitive blood vessel or two, and a pair of simple excretory organs, are found in some species.
9. The higher worms, in which the front part of the alimentary or digestive canal is transformed into a respiratory or breathing organ—hence they are called "gut-breathers." These show the forerunner also of the spinal cord.
10. This is found in the amphioxus, the link between the vertebrates (animals with a bony spine) and the invertebrates. It possesses no skull, no vertebrae, no ribs, and no limbs, but the mesoderm (the skin-layer which produces bone) is arranged in segments.
11. The cyclostomata—the lamprey eels and hagfishes, the lowest cranial or skulled vertebrates known to science. They are without visceral arches, jaws, or paired limbs, and possess a primitive cranium. They live in the mud, or leech their bodies upon other fishes.
12. The first real fishes—sharks and rays, the primitive elasmobranchi. These existed as far back as the Silurian age. They have typical jaws, gill-bearing arches (permitting water-breathing) and four fins or limbs.
13. The crossopterygii, more complicated fishes, extinct but for two living representatives.
14. The dipnoid fishes, appearing in certain mudfishes today. The air bladder has been modified into a lung, so that the fishes can live for long stretches without water. These connect the fishes and the amphibians.
15. The oldest amphibians, with the paired fins of the dipnoids converted into four 5-fingered limbs; the more primitive having gills and lungs, the higher forms lungs only.
16. The lower reptiles (proreptilia), extinct but for two slightly-known living descendants. Gills are entirely suppressed, though gill-slits appear in the embryos, or unborn young.
17. The mammal-like reptiles, or sauro-mammalia, found only in fossil remains.
18. The promammalia, a large group of primitive mammals, nourishing their young with milk, yet retaining many reptilian characteristics. The duckbill and the spiny

anteater are the living representatives. Both lay eggs like reptiles; there are no teats, and the milk oozes out of pores in the belly, whence the young promammalia lick it off as best they can.

19. The marsupials, whose young are not placental (connected with the mother by a membrane, the placenta, permitting absorption of nutriment, as in higher mammals). The teats are in a pouch in the skin of the belly, and the young are placed here shortly after birth. The kangaroo and opossum are the chief living examples of this group.
20. The placentalia, or mammals with a placenta. Extinct lemuravidae represent this group, the parents of the monkeys, apes, and men of today.
21. The lemurs, the lowest genuine monkeys—little squirrel-like creatures, with non-prehensile tails, the limbs modified into 5-fingered hands and feet of the arboreal or tree-dwelling type, protected by nails. The existing species are found chiefly in Madagascar.
22. The simiae, with teats on the breasts only, with flat nails and usually a long prehensile tail, especially noticeable in South American members of the group.
23. The catarrhine monkeys, tail long, body heavily furred, nostrils pointing forward and downward, instead of to either side, as in lower monkeys.
24. The anthropoid apes, large, tailless, scantily haired, walking semi-erect, but with arms longer than legs. The orang-otang of Sumatra and Borneo, the gorilla and chimpanzee from equatorial Africa, the gibbon of Asia, are of this type.
25. Pithecanthropoi, ape-like men, found only in fossils, in the upper Pliocene strata of Java.
26. Man, existing since the Pleistocene (the Glacial Eras), probably originating in south central Asia. As Haeckel said in 1898, "The descent of man from an extinct Tertiary series of Primates is not a vague hypothesis, but a historical fact."

MAMMALIAN LIFE

Of the aquatic mammals, in the whale the tail has become a propeller, which sculls the water from one side to the other, permitting great speed in swimming and diving. In seals, the hind limbs are bound up with the tail, forming a propeller churning the water briskly to right and left. In the walrus, the paddle-like fore limbs aid greatly. On land, the seal moves much as a snake does. The whales are mammals, suckling their young in the open sea, by a special adaptation giving them huge mouthfuls of milk at a gulp. Some whales can remain under water an hour and twenty minutes, due to the immense chest cavity and other unusual adaptations.

Other mammals, such as the mole, lead an underground existence. The hand is turned into a shovel, with which the mole literally swims through the earth. The eye is almost gone, since it is not needed. Moles can run along the surface at the rate of about 2½ miles an hour; pairing and mating take place above ground. Within five weeks, the helpless young have grown able to follow their mother, and begin mining; the males especially are very quarrelsome and belligerent. The strength of the mole is so great that, if a man's strength were in proportion, he could lift more than 6,000 pounds. A mole can eat its own weight in earthworms in 24 hours, and adults require food every 3 or 4 hours.

Tree mammals, such as monkeys and squirrels, lead to aerial mammals, like bats. The speedy antelopes, the strangely adapted camels and dromedaries, are fitted for desert spaces; mountain mammals, like bears, yak, and goats, show adaptation for their environment. Cud-chewing animals (cattle, sheep, and deer), which eat grass, require a large feeding to give the proper amount of nutriment; and, since there is constant danger of enemies, they are able to consume large amounts rapidly, and then, retiring to safety, to re-chew the hurried meal. The stomach has several chambers; in the capacious first compartment the grass is stored, and acted upon by certain digestive fluids; the lower stomachs prepare it for the true stomach below.

Mammals have many weapons of offense, such as teeth and the antlers of the deer. For protective armor, the mammals have bony skin skeletons (as in armadillos), scales of horn, the spines of the porcupine, the armored hide of rhinoceros, hippopotamus, and elephant. Many reptiles, amphibians, snails, and insects, pass into a lethargic state or resting period when winter comes on; only mammals show true hibernation, which is neither sleep, nor necessarily connected with winter. Hedgehog, dormice, bats, the spiny anteater, and other animals show this trait, which consists in conserving the body energy in a sheltered place until the expenditure of energy is at the minimum. This is as much a part of the racial rhythm as sleep in higher mammals.

Sleep is the adaptation of the mammal to the rhythm of the sun. Life, in its higher forms, requires sunlight; in its absence, life must find energy to prolong itself through the dark period. The problem has been met in two ways: by living more slowly, and consuming less energy, during the night; and by using some of the energy already stored up in the body. A different solar system, as one with two or more suns, would have caused a different sleep rhythm. In a remotely similar way, the monthly menstrual periods of women seem controlled by the moon's rhythm; although science has so far failed to delve deeply into this.

THE EVOLUTION OF SEX

So far, we have accepted division into sex as a matter of course, in living creatures. Lester Ward, the American biologist and sociologist, for the first time isolated and described the amazing procession of the sexes, to picture the evolution of sex—one of the most important discoveries in the whole field of biology. Reproduction, Ward points out, is different from sex; it is practically identical with nutrition. Haeckel describes reproduction as "a nutrition and a growth of the organism beyond its individual mass, which erects a part of it into a whole." Long before division into the sexes, reproduction functioned in many ways, including:

1. Fission, or division, as in the case of the ameba; where two sections, approximately equal, of the original organism, by division become two new organisms.
2. Gemmation, or budding, where the division is into two unequal parts, which can be called mother-cell and

daughter-cell. In both of these instances, the whole organism may be called immortal. Death does not enter in until cell specialization is reached.

3. Germinal budding, or polysporogonia. Here a group of cells, in a many-celled animal, separates and gradually develops into an individual similar to the parent. Some zoophytes and worms illustrate this.
4. Germ cell formation, or spore formation (monosporogonia, or sporogonia). Here a single cell becomes detached, escapes from the parent organism, and then develops, increasing by division into a multicellular organism like the parent. This exists in low types of vegetation.
5. Virgin birth, or parthenogenesis, where germ cells similar to eggs have the power of developing without fertilization. Among bees, this produces only males—a blind alley of reproduction, which could not perpetuate the species. Among certain aphids or plant-lice, this produces females—an instance of real parthenogenesis.

There may have been other steps, whose trace has been lost.

Reproduction has for its sole end the perpetuation of life; sex, to secure cross-fertilization, or the interbreeding of different parents. This speeds up the process of organic evolution, and hence, by increasing variation, allows natural selection to operate more rapidly.

Below sexual differentiation we have the union of similar elements, which apparently mutually strengthen each other. In order for cells to unite, there must be some interest for this: and nature developed the sex urge as this interest. By the law of parsimony, this was restricted largely to one of the two mating cells—the smaller, more active male cell. The female, which must contain also a certain amount of food to support the new organism until it is able to fend for itself, lacks some of the insistent urge of the male. This development occurred slowly, an intermediate stage being

6. Alternation of generations, in which after a long series of asexual or sexless reproductions, the creature went through a resting period, followed by fertilization. In

this stage, the asexual periods grew gradually shorter and shorter, until at length we reach

7. Sexual reproduction.

Where did the male sex, as a separate organism, first develop, in the upward course of life's development? At first the male element appears as an inconspicuous fertilizer, attached to the female body, as it continues in many plants. It was always smaller than the female; in the case of men, the female ovum is 3,000 times as large as the male spermatozoon. Among the cirripedes, which include the barnacles, Darwin observed the first separate male, in discovering that the female had little valves or pockets, 2 to 7 in number, in each of which she kept a little pocket husband, which she had produced from her own body. When she was ready to mate, she selected one of these.

Other low males are the nematode, where the entire visceral or intestinal cavity is filled with testicles. Among the spider family, the female is far larger, and at times (as in the case of the praying insects, or mantises) the female eats the male wholly during the course of his fertilization of her. The price of love here is death. Male mosquitoes often take no nourishment, or sip only water. The male bees are useless, being called the drones. In most other insect families, the females are larger. The smallest known vertebrate has females one-fourth larger than the males. Male fishes (called commonly "studs") are usually smaller than the females, and many fishermen throw these back into the water. Among birds, in some of the older families, as the hawks, the sexes are approximately of the same size. In nearly the whole family of rodents, among mammals, the same thing is true.

The force that lifted the size of the male, from the insignificant pocket husband to the height of a Cro-Magnon or Viking giant, was sexual selection. The female had a number of males from whom to choose: what would determine her choice? Size would come first; then some feature agreeable to the female. Out of this came man's esthetic, or beauty-appreciating, quality; and this process gave the brilliant coloration to male birds, the secondary sexual characteristics like antlers to deer, manes to lions, and beards to goats and patriarchs. A third basis of selection would be the so-called moral qualities, like courage in a contest. Fights among male animals are rarely more than a display of strength and agility, and hardly ever lead to death; moreover, male animals never fight their females, or force them sexually. It remained for man, who calls himself the crown of the animal world, to mistreat women and force them.

What caused this overturn, replacing the long feminine dominance with masculine dominance, once the human stage was reached? This depends upon the fact that fatherhood is not recognized among animals, or primitive human beings. When the idea of fatherhood came—of some physical connection between mating and the birth of the child months later—it came slowly and fumblingly at first. If a male ventured to suggest it, he met only ridicule: "You kin to the child? But the mother had to be sick to bear the child; you were not sick." Unanswerable logic, to a savage mind; some answer as unanswerable must be discovered. So the awkward savage reasoned out an answer; and the father pretended to be sick, went to bed at the time the mother was confined, and groaned quite as loudly as she. This strange custom, still surviving among certain savage tribes, is called the *couvade*. It was the savage father's dumb method of establishing that he was kin to his own child.

One dark consequence grew out of this. The father's next logical step was, that, if he was kin to the child, the child was his, and he, the father, was entitled to the child's services. If the mother protested, the father measured his strength—made greater than hers by her sexual selection over many centuries—against her strength: the first clash of the sexes in the history of life. The man demonstrated his greater strength, and subordinated child and woman to his power; and the long black period of man's rule of woman commenced. Only today are women lifting themselves out of this black bog, into which the men of their race thrust them.

THE BIOLOGY OF TOMORROW

Haldane points out that the science of the last generation has had its emphasis on physics and chemistry; and that tomorrow will belong to the biologist. Mathematical physics has already destroyed classic mathematics, when Einstein displaced Newton and Euclid; just so biology, he says, will invade and destroy mathematical physics. Instead of the wasteful method of using lamps for illumination, where 95% of the radiation, in the form of heat, is invisible, cold light may be isolated by the biologists, and utilized. Our poets and artists—he might have added our philosophers as well—are, in the main, totally ignorant of chemistry, physics, and the other sciences; man's imagination will leap, when fed on the solid nutriment of science. Just so scientists must educate capital and labor in art; the moment the capitalist learns that art increases productivity, he will turn himself inside out to make his factory artistic. Chemistry will furnish food so cheaply that agriculture will become as much of a luxury as a hand-loom. The chief biologic inventions of the past, Haldane says, have been:

1. The domestication of animals.
2. The domestication of plants.
3. The domestication of fungi, to produce alcohol.
4. The change from the posture of animals in sexual union to the human posture.
5. Bactericide, or methods of killing harmful bacteria.
6. Artificial control of conception, or birth control.

Biology in the future, he says, will go further. Physical and chemical discoveries are regarded by backward-looking men as blasphemies, as in the cases of Copernicus and Bruno; biological discoveries commence by being regarded as perversions, and end by being accepted as a ritual supported by unquestioned beliefs and prejudices. As Darwinism shocked the last century, so we may expect vaster shocks of increasing force, setting all our pet accepted superstitions to tottering. Unlimited food from the ocean and chemical substances, the abolition of disease, lichens to bind the desert sand, and ectogenesis, or the birth of human children from ovaries removed out of women's bodies and fertilized by spermatazoa in a laboratory—these are a few of the strange biological inventions he prophesies.

Among interesting recent developments in biology are Abbott H. Thayer's exhaustive researches into protective coloration in plants and animals. He discloses that coloration in animals is chiefly for the purpose of obliterating or altering the outlines of the animal. The mechanism of this obliteration is dealt with at great detail.

MASTERPIECES OF BIOLOGIC WRITING

Perhaps the most generally fascinating feature of biological work has been the fact that several authorities upon the theme have been men of exceptional literary charm, who make their array of scientific facts more thrilling than the best detective story, and as delightful as your favorite author. Jean Henri Fabre, the distinguished French entomologist or student of insect life, devoted his later years to this field of study. His separate stories upon the lives of flies, mason-bees, hunting wasps, caterpillars, grasshoppers, and other insects, open up a world of biological marvels, told with the skill of a master craftsman. Such spider dramas as the assassin tarantula's attack on the carpenter bee, and the Lycosa female spider's murderous mating, are unforgettable. To watch the female Thomisus or Lycosa spider bind her egg-pouch to her body, and go bumping over the ground with this strange burden; to see her strange young hatch, and the 200 or more of the young mount their mother's back for a journey of six months or more—Fabre has given us eyes to see all this. As he points out, this is all done without the aid of a thinking faculty, as we esteem thinking; instead, we have an instinct so dull, that the spider mother can not detect the substitution of an artificial ball of cork for her egg pouch, and has no notion of the number or identity of her young. There are greater miracles told here than all the old religions of the world offer; and these are miracles of science.

Quite as graceful a presenter of his material, is the American William Beebe. *Jungle Peace,* with its commendatory foreword by his friend Theodore Roosevelt, was the first of his popularizations of science that appeared—books holding persisting charm for all. This first book is memorable for its picture of the hoatzins of British Guiana, those strange reptilian birds, who, even when young,

> crept on all fours, they climbed with fingers and toes, they dived headlong, and swam as skilfully as any Hesperornis of old. . . . To see a tiny living bird duplicate within a few minutes the processes which, evolved slowly through uncounted years, have at last culminated in the world of birds as we find it today—this is impressive beyond words.

As a scientist, he studied a square yard of soil in the neighborhood of Hudson Bay, and found there only 8 forms of life. Study of a similar square yard in the treed neighborhood of New York City revealed 150 forms of life; study of a similar yard, in British Guiana, gave him more than 1,500 differing forms of life, all in this tiny space—so lush and bursting with life are our hot tropical regions. I know few more thrilling stories than Beebe's sagas of the army ants and the atta ants, the thousand hours unceasing flying of the cloud of crane-flies in an earthen cavern under jungle roots, the courtly contests and strange peace offerings of the iguanas of Galapagos, the tiny Sargasso free-swimming fish who surrender movement to barnacle themselves as shellfish for the rest of their lives. When science is clothed in such telling, men can taste it with relish.

Another interesting department of biology is physiology, the science of the human body. Every portion of the bony skeleton has evolved from our animal ancestry; each part of the alimentary system, the nervous system, the muscular system, has similar kinship with the animals below man. The various senses have emerged from specialized, highly sensitized portions of the skin; the human machine is an adapted product of far simpler earlier forms.

There is no longer any dissent as to the fact of the evolution of man from animals earlier in the life chain; only the exact method causes disagreement. In nature's tremendous rhythm, the 70,000 follicles or pockets in the girl child's ovaries at birth decrease to about 200; and one of these, each lunar month between puberty and menopause, matures, with a single ovum or egg. For each matured ovum thus released, prodigal, uneconomic nature has the male develop 850,000,000,000 spermia. The human embryo recapitulates, in the large, the whole chain of life, starting as a one-celled ovum, passing through stages corresponding to all the stages of man's evolution. There are successive traces of the segmented worms and insects, of the gill-arches of the fish (which develop marvelously into the complicated human throat), of a bodily hairy covering still arranged as it first grew out of the scales of our reptilian ancestry, of extra milk glands in every one individual out of 500, derived from earlier mammalian ancestry, and even of a vestigial animal tail. Every organ of man's body shows its traces of animal ancestry, and of the strange successive adaptations caused by the change from water to land, from egg-laying to placental birth and suckling, from tree life to the erect gait of the higher apes and man. Man, during the nine months fetal or embryonic period, recapitulates the vast duration of the following table of development:

THE EVOLUTION OF LIFE

ERA	EPOCH OR PERIOD	ADVANCE	DURATION IN YEARS
Psychozoic— Age of Man	Recent	Civilization	25,000
Cenozoic— Age of Mammals	Pleistocene (Ice-Ages)	End of Great Mammals	500,000
	Pliocene	Man-ape becomes man	40,000,000
	Miocene	Culminations of mammals	
	Oligocene	Higher Mammals	
	Eocene	End of archaic mammals	

ERA	EPOCH OR PERIOD	ADVANCE	DURATION IN YEARS
Mesozoic—Age of Reptiles	Cretaceous	Archaic mammals End of great reptiles	150,000,000
	Jurassic	Birds	
	Triassic	Dinosaurs	
Paleozoic—Age of Fishes	Carboniferous	End of ancient life Land vertebrates Primitive reptiles	360,000,000
	Devonian	Amphibians	
	Silurian	Lung fishes	
	Ordovician	Armored fishes	
	Cambrian	Shellfish	
Proterozoic—Age of Early Life		First invertebrates	600,000,000
Archeozoic—First Life		Unicellular animals	1,000,000,000
Azoic—Lifeless Age			

ADDITIONAL READINGS

BIOLOGY. For a survey of the whole field, *Elementary Biology,* by Benjamin C. Gruenberg (New York, 1919), is scholarly and comprehensive.

BOTANY. The most readable study of the vegetable world is *Botany: The Science of Plant Life,* by Norman Taylor (New York, 1922).

ZOOLOGY. *The Study of Animal Life,* by J. A. Thomson (New York, 1905), is informative.

PHYSIOLOGY. For a comprehensive book treating of the human body, *Principles of General Physiology,* by W. M. Bayliss (New York, 1919), is an adequate summary.

EVOLUTION. The two most famous expositions of evolution as based upon Darwinism are *The Evolution of Man* and *The Riddle of the Universe,* by E. Haeckel. Darwin's own volumes are available, although somewhat dull.

INSECTS. The most charming treatments of insects are the separate volumes by Jean Henri Fabre, especially *The Life of the Spider, The Life of the Caterpillar, The Life of the Grasshopper, The Mason Bees,* and *The Hunting Wasps.*

BIOLOGICAL EXPLORATION. The volumes by William Beebe, *Jungle Peace, Jungle Days, Edge of the Jungle, Galapagos: World's End,* and *The Arcturus Adventure,* are the classic accounts of scientific explorations in the field of biology in out-of-the-way places, accurate and highly interesting.

6. Psychology

THE ROOTS OF THINKING

We have found, in our study of biology, that protoplasm developed two properties, motility or the power of spontaneous mass movement, and irritability. From the latter of these came feeling, based upon agreeableness or its opposite (the pleasure-pain origin of feeling); and out of feeling came awareness or consciousness, from which the manifestations of mind spring. To the race, the function of awareness—of rendering the organism better able to secure its nutriment, and of making it aware of dangers in the environment, requiring its flight—was all important; to the individual, the feeling (toward pleasure, away from pain) was all important. This early antithesis, or opposing operations of function and feeling, is important. So long as feeling and function operate jointly toward the same end, pleasure means life and health, growth and multiplication, while pain points to danger, injury, waste, destruction, and race extinction.

The roots of mental activity go very deep, to the very beginning of life; and these roots in turn burrow deeper, into the physical and chemical behavior of colloids, crystals, and lower forms of chemical substances. It is customary to speak of the mental processes of animals below man as instinct, and those of man as instinct and reasoning. We shall reach a definition of instinct later; it is only necessary here to say that these two merge insensibly into one another, and that their mutual relationship, when we arrive at it, will be surprising to many.

Classic psychology concerned itself almost exclusively with the operations of an individual mind, studied subjectively. That is, the psychologist sought to look within his own mind, and to deduce from this observation laws of universal application. We know today that instinctive and reasoning processes are so entangled with the existence of other outside persons, that such an isolated subjective method could not yield a clear understanding. Let us see first what it did yield.

Interesting experiments have been carried on, with forms of life as low as minnows, which indicate that these may be taught to associate an external object, like a colored card, with the presence of food; until they act, in the presence of the colored card, just as if food were presented to them. A turtle has been studied for similar traits of reasoning, and has been found to possess them to a higher degree than the fishes. As we rise into the birds and mammals, the ability to reason increases rapidly. The monkeys illustrate these high powers:

1. Attentive persistent experiments.
2. The rapid elimination of useless movements.
3. Recollection of the solution, once it is discovered.

Instances of monkeys that can be taught to skate, ride the bicycle, thread needles, untie knots, smoke cigarettes, string beads, and unlock locks, are not as impressive as the sight of a chimpanzee who had worked out a method of securing peanuts from the audience. The difference is that the first was mechanical imitation, with no gain to the monkey, unless an artificial reward; whereas the latter activity led to a satisfaction of its own feeling.

A chimpanzee in the Central Park Zoological Garden in New York City would wheedle, by cries and gestures, the spectators, until they tossed peanuts on the solid iron top of his cage. Then he would pound persistently, with light taps, outside the place where he had heard the peanut fall above him, until he had bounced it several feet frontwards, to the very edge of the cage top; whereupon his agile hand would reach around the top of the cage, and capture the peanut, to satisfy his craving for it. The taps had to be gentle, and never so vigorous as to bounce the peanut off the cage-top to the ground, out of reach below. Here was a method, arrived at by a trial and error process, which may be called reasoning.

SENSATIONS, PERCEPTS, CONCEPTS, AND IDEAS

Sense-experiences form the basis of our mental life. The various senses—touch, sight, hearing, smell, taste, temperature, and perhaps others—operate through sensory nerves communicating with the central brain. The brain consists of the large cerebrum, occupying the upper front part of the skull cavity, whose outer surface or cortex is the seat of sensation and volition, or willing; and of the cerebellum, the lesser brain, lying at the back of the head. There are more than 6,000,000,000 nerve cells in the brain—five or six times as many as the number of people occupying the entire earth.

A recurrent or repeated stimulus on any nerve produces at first reflex actions and tropisms. *Reflex actions* are mere automatic movements of nerve cells, and of the muscles controlled by them; *tropisms* are obligatory movements of the whole animal, which become common to the whole group of animals of the same kind. Still higher comes instinctive behavior, reaching its highest expression in ants, wasps, and bees. The instincts function through heredity; that is, instinct requires no education, but the being is born with a predisposition toward a certain action, whenever a certain stimulus is applied. Mind has grown directly out of matter, as a property of matter; and reasoning is merely a higher use of the same organs—nerves and brain—than the earlier reflexes, tropisms, and instinctive actions. Many of our activities (such as twitching away from a light touch, moving back from heat, and the internal digestive processes) still function through the ancient forms of reflexes, tropisms, and instincts.

When knowledge first awakens in a child, he is confronted with two obvious facts:

1. The existence of the world in which he lives; and
2. The existence of an awareness within himself.

These two give, respectively, the objective and subjective aspects of mental activities. The subjective world—the world of I—we recognize directly; the objective world—the world of not-I—we recognize through our senses, or through the I. Thus both objective and subjective are communicated to us through subjective channels. The two, in the last analysis, are, to us, one.

The fundamental unit of our mental receptivity is a *sensation.* This is a change in our nervous organism, produced, it seems to us, by some change or activity of the external world, in relation to our consciousness, or some change in our consciousness in relation to the external world. Sensations leave a trace in the memory. Accumulating memories of sensations begin to blend in the consciousness into groups, and according to their likenesses or unlikenesses tend to associate, or to be opposed.

Groups of sensations, registered on the memory, produce a *perception.* These group themselves not only according to likeness or unlikeness, but also according to the time of the reception of the sensation, and other elements connected with its reception.

Groups of perceptions at length form a *concept,* or classification of different objects as having some abiding kinship. Thus we have a sensation of an object, as a certain oak tree. If repeated sufficiently, this forms a percept of the tree—one tree, *that* tree. Percepts of many trees form a concept of trees in general.

Groups of percepts or concepts form an *idea.* Ideas broaden into constantly widening recognitions of kinships between things or ideas, which are called *generalizations.* The power of generalization, on the largest scale, is man's highest reasoning power. All of this has been rooted, do not forget, in feeling, or emotion—a reaching toward something desired, a reaching backward from something not desired. Thinking, as we shall see, developed merely as a means of achieving emotional desires. In other words, we *want* first, and then, to aid in securing what we want, we think reasons why and how we should get it. That is why mental processes can produce, in different minds, arguments equally strong for or against any proposition. For reasoning is just a courteous and complicated illusive method of clothing "I want that."

GROWTH OF MAN'S FACULTIES

Malcolm H. Bucke has drawn up a table of the development of various faculties in man, which is still disputed in part by scientists, but has not been so far adequately answered.

Name of faculty	Age of appearance in man	Absent in what proportion of adult men today	Time of appearance in the race	How far back does faculty reach in prehuman forms?
Memory	Soon after birth	None	Prehuman	Echinoderms
Simple consciousness	Soon after birth	None	Prehuman	Echinoderms
Curiosity	Ten weeks	None	Prehuman	Insects and spiders
Use of tools	Twelve months	None	Prehuman	Monkeys
Shame and remorse	Fifteen months	None	Prehuman	Anthropoid apes
Sense of the ludicrous	Fifteen months	None	Prehuman	Anthropoid apes
Self-consciousness	Three years	In 1 in 1,000	300,000 years ago	Peculiar to man, probably
Color sense	Four years	In 1 in 47	30,000 years ago	Peculiar to man, probably
Sense of fragrance	Five years	?	?	Peculiar to man, probably
Musical sense	Eighteen years	More than half	5,000 years ago	Peculiar to man

We have seen, as the first three standards of female sexual selection, (1) size, (2) male efflorescence, as brilliant colors, and ornaments like antlers, manes, and beards, and (3) the so-called moral qualities, such as courage in combat. At about the time that the primitive ape-man blended into true man, we find another standard of female sexual selection, whose presence in primitive man is evidenced by the preservation of his stone tools. Certain animals use a stone of convenient and handy size and shape—wasps and apes have both been observed to do this—and may use as a missile or club a cocoanut or a handy tree-branch. But no animal, as far as is known, alters his tools out of the raw materials of his environment, until we come to primitive man. Such activity requires a primitive reasoning process, the growth in man of a definite rational or reasoning faculty. This means no more than that primitive man was capable of reasoning about the simplest and most material things. This quality, or primitive shrewdness, marked out a mate as desirable, as surely as the earlier qualities—size, brightness of color or impressiveness of male efflorescence, or courage in fighting—so marked him. Thus increased brain mass became a secondary sexual characteristic. Female preference, eliminating the less brainy males, became potent in increasing the sagacity and brain power of the race.

We have already seen how man used this increased brain power in reaching a fumbling recognition of the fact of fatherhood, of his kinship to his own child; and how, from this, and the consequent matching of his strength with the female—the first instance of conflict between male and female in the evolution of life—the degradation and enslavement of woman and child, and subsequently of other men, resulted. Out of it also came man's stumbling steps toward an understanding of himself and the universe which cradled him, including the error-ridden systems of primitive religion, pseudo-science, and philosophy. All this was a needful slough, through which the maturing man must wallow, before he could stand erect in some recognition of his brief tiny role in the starry universe, and of the cloaked realities of that universe, which could never wholly be his to know. Stumbling through the slough of error is a more evolved state than the comparative absence of any reasoning faculty, in which the fattened house cat and its jungle kin stagnate. These do not question, and remain low and unthinking; man's thinking may result in error or suffering, but the presence of thinking is an upward step.

CLASSIC PSYCHOLOGY

A child is born without ability or skill to perform the simplest parts of our daily ritual. It can not stand erect, walk, speak, eat properly (except the instinctive suckling), or perform any one of a thousand acts which an adult human performs as a matter of course. Step by step the child learns these things, and lets them become so rutted and grooved in the consciousness that they sink into the unconsciousness, in the form of habits. A beginner at anything, such as walking or eating, a sport like baseball or golf, or playing the piano or typewriting, at first performs each step in the process with concentrated brain attention; in the end, the steps become habitual, and the brain's attention is freed for other matters, or for further perfection of the activity. Much of our day's activity consists in a mere routine of habits; with some people, this constitutes all of the day's activity. These people might be spoken of as prematurely dead; for habit is only justified, if it releases the mind for other activities.

Classic psychology proceeds to long analyses of perceptual thinking, conceptual thinking, attention, interest, conation (or striving), imagination, memory, original and derived emotions, and a thousand more subjective elaborations, stated ordinarily as dogmatically as if these things were thoroughly understood. Such purely descriptive, individual psychology misses the main facts of the mind's activities. The simplest fact is that all that the mind holds it receives as sensory impressions, except for possible instincts received by heredity; and that all thinking—including the most towering structure of metaphysical or philosophic reasoning—is merely the addition, subtraction, and varied combination of sensory impressions received by the limited senses.

PSYCHOANALYSIS: THE SUBCONSCIOUS

Recent researches by Sigmund Freud of Vienna, and his followers, Jung of Zurich, Adler of Vienna, and others, have opened up an entirely new concept of psychology, which is slowly growing in its acceptance among scientists everywhere. Their method of analysis of mental and submental processes is called psychoanalysis, and deals largely with the subconscious activities of men. There are those who deny the existence of a subconscious mind. A moment's reflection will convince any intelligent person of its existence, and its immense range.

You had breakfast yesterday morning. You sat in a certain place, alone or with certain people; you ate certain food, said certain things, thought certain thoughts. Now that you are reminded of it, this all comes back to you: you can picture the whole process. Where was this mental picture before you commenced this paragraph? It was not non-existent, or you could not have re-created it so readily; for what you have just done, after commencing to read this paragraph, is to reproduce the past, not create an imaginary past. It was not in your consciousness; you were thinking of something entirely different. It was, of course, in your subconsciousness.

This vast field holds your recollection of every sensory impression that ever reached your brain; and, besides that, many that never reached your consciousness at all. Looking at a crowd of a thousand people, your eye photographs all of them, and a record of this is kept upon the sensitive brain. Some especial stimulus may later bring up any one of these faces, although it may never have reached your conscious mind before. The subconsciousness (sometimes called the unconscious mind) also holds the instincts, and perhaps certain inherited memories, if indeed these can pass down the life-chain from parent to child. When you consider that a man 40 years old has lived 630,720,000 seconds, awake more than half of the time; and has taken in often far more than a hundred sensory impressions per second, you see what a tremendous number of things the subconsciousness must contain.

The subconsciousness reveals its presence in many strange ways. Slips and errors of speech, mistakes in words and unconscious puns, forgetting a word, name, object, or task, and losing or mislaying an object, are among these. The thoughtless person objects at once that these things are insignificant,—are without cause. But the smallest scratch on the largest stone boulder has had its cause: does a thoughtful person actually hold that the mind may do things without cause? Often, when we have decided opinions, or think we know the truth, social breeding or some other cause makes us plan to tell a polite lie. The subconsciousness repeatedly tricks us into actually speaking the truth, to our great embarrassment. When we mean to say, "I'm sorry not to be able to come to your party," the subconsciousness may twist this into, "I'm not sorry not to be able to come to your party." Repeatedly my typewriter, automatically registering what I am thinking, rather than what I plan to say, will correct an intended polite lie. A philanderer planned to write, "My motto is, live and let live"; his typewriter wrote, at the dictates of his unconscious, "My motto is, love and let love." A Socialist paper, before the war, appeared in Berlin with the statement that, at some function, among those present was the Clown Prince. Indignant police officials threatened arrest of the staff and stoppage of the paper; whereupon the contrite sheet appeared the next day with an apology, ending, "Of course, what we meant to say was that among those present was the Clown Prince"—repeating the very error; and all unintended. Thus trifles betray our real thoughts and desires.

When you forget a person's name, as a rule this means that for some reason you dislike the person; or that you have some disagreeable emotion associated with the name. Do not let this worry you; most of us dislike almost all of the rest of us; so such mistakes may well be common. When I know or feel that I have worked enough, but determine consciously to keep on, I usually manage to lose my pencil, my pen, or my glasses; all unconscious defense mechanisms, to force me to stop. As soon as I dig down mentally into the reason for mislaying the needed article, I can reconstruct the chain of recollections leading to mislaying it, and can usually find it without further delay. If I feel that I have smoked enough, but still desire consciously to smoke, I manage to lose my pipe, or go out without tobacco or matches. Again, if you call at a place to which you wish to return, a common mechanism is to forget there some object you care for—a book, a package, anything: a purely unconscious method of providing yourself with an excuse for a return. If the forgotten object, however, is something which you do not like—as an umbrella, an old hat, a pair of gloves you are ashamed of, a package you wish to lose—the meaning simply is your desire to get rid of the undesired article. In all such cases, your conscious mind is blank; the unconscious is the directing force.

DAY DREAMS AND DREAMS

Another manifestation of the subconsciousness is what are called day dreams. Tell your mind to go blank, and stay blank; lean back in your chair, eyes closed, and order yourself to think about nothing. As a rule, the mind can not stay blank for long; you begin to build a scene, or an activity in which you take some part. The scene is almost invariably one to which you wish you could go; the activity is one you wish you were doing. As you go to an important interview, as when you go to apply for a job, all the way to the meeting your mind daydreams the interview, in every case turning out as you wish it to turn out. If you need a hundred dollars, your day dream will probably be that someone gives you this sum, or of earning it—this sum, and larger sums. One's imagination is weak indeed, if he does not mentally picture himself a millionaire at least once a month.

A stronger proof of the subconsciousness is the dreams during sleep. Dreams were once regarded as pictures of the future; the Old Testament holds many of these. The pendulum swung the other way; for centuries educated men have regarded dreams as meaningless nonsense. We all know what a dream is: what does a dream mean? Take the simplest dream—the dream of a child, for instance. A child is told by its mother that it cannot have a second helping of cake or ice-cream for supper. All night long the child may dream of eating an endless amount of cake and ice-cream. Thus the dream expresses a wish, phrased as a wish fulfilled; to use Freud's terminology, the dream expresses a wish-fulfilment. The dream of a man in jail is almost as simple: usually consisting of seeing himself outside, or in the act of escaping successfully. The constant dream of the lower social class of Negroes in America is that they are white—a simple wish-fulfilment. With the same unction they sing in church, "Wash Me, and I shall Be Whiter than Snow." Many Negroes of this class are sure that, in heaven, they will be angels with white faces and bodies. In all these cases, there is complete agreement between the wish when awake, and the wish when asleep. These dreams all come without symbolism.

Suppose, however, that the thing that the person wishes is something which he has been taught is wrong, and should not be wished. Suppose a young man is engaged in a taut conflict of ideas with his father: the young man wishing to do one thing, the father insisting he must do another. The young man's first impulse is to wish that his father were out of the way; or, wording it childishly, as dreams so often do, that his father were dead. Yet he had been taught that to wish his father dead is a sin. Accordingly, an element of the subconsciousness, called the censor, comes into play. The censor sits guard at the gate of consciousness, keeping out all ideas which the consciousness (usually through the teachings of others) is unwilling to entertain, because they are held to be wrong or sinful.

There are two ways that the censor might let this dream, or wish-fulfilment, of the father's death escape into the consciousness. One is to add an element of grief: the son dreams that his father is dead, and that the son sits weeping beside the coffin. The dream has expressed the wish as a thing fulfilled; the censor's shrewd hypocrisy has added the crocodile tears. Or the censor may use another method, and disguise the person dead, so that the son sees the funeral of Longfellow, or Moses, or Santa Claus, or any older man who remotely represents the father. The dream may contain apparent absurdities, as of a modern man seeing the funeral of Moses conducted by the family undertaker; but there is no absurdity in the real meaning of the dream, once this is understood.

Freud for the first time emphasized the tremendous importance of the first few years of a child's life, in controlling his future development. The child sees his father as practically god the father, his mother as the god-mother. From them he gets all that life gives him, in the way of rewards and punishments, at first; from them he receives the food that means life, the shelter and clothing that protect it. No god could do more. The child's first love object is his mother; even the suckling of a baby, as Freud points out, is a sexual act, the child and the mother both receiving definite sexual pleasure from it; for both the nipples and the mouth are erogenous zones. Women, during the love episode, enjoy having the breast kissed—for the kiss here awakens a definite amorous thrill. Thus, as he grows up, the son pictures his mother necessarily at first as the ideal woman; and in an unguessed number of cases his close tie emotionally to her, and similarly the daughter's tie to the father, is the dominant emotional influence of the son's or daughter's life.

SYMBOLISM IN DREAMS

Although symbols occur constantly in dreams, the things symbolized are relatively few in number. These are chiefly the human body as a whole, parents, the mate, children, brothers and sisters, birth, death, nakedness, and the sexual organs and acts. In some way all of these have become, in the minds of many, by misguided ethical teachings or by the particular wish affecting persons close to us, things not to be represented directly in the consciousness, in the connection in which the powerful dream-wish presents them. We are taught that the body, nakedness, the sexual organs and acts, are immoral and naughty: a teaching that constantly frigidifies women, and effeminatizes and incapacitates men. Thus the human body is often symbolized as a house, one with projecting balconies or ornaments being a female body; just as our bodies, in religious language, are temples of god. Parents usually appear in dreams as kings and queens, or persons highly respected: "Once upon a time there lived a king and queen," the typical fairy story opening, referring to the parents of the creator of the tale. Brothers, sisters, and children are usually represented by vermin or little animals. Birth is usually referred to by some connection with water: life itself commenced in the water; the human embryo is in a water sac; and any body of water normally represents the mother. Death is taking a journey, riding a white horse, riding in a train. Nakedness is often symbolized by partial disrobement.

The symbolism of the sexual organs and acts is rich. It must be remembered, however, that each person's symbol may be peculiar and non-typical. Thus a snake, to a biologist, might represent his goal; to a snake-charmer, her means of livelihood; to the ordinary adolescent girl, the man's phallus or sexual organ. The snake in the Garden of Eden story comes to mind. The sacred number 3 represents the male genitalia: the Christian cross, and the ancient 3-legged man, point to the same thing. The male organ itself is obviously symbolized by objects long and upright, sticks, poles, trees; by penetrating objects like knives, swords, spears; by explosive objects like guns, pistols, faucets, fountains; by umbrellas, which can rise, and, analogously, by balloons and airplanes. The girl's typical dream of an assault by a man with knife or pistol, or of a snake creeping under her clothes, is a wish, in the unconscious alone, for sexual intercourse.

The female genitalia are symbolized by such enclosing objects as pits, caves, pitchers, bottles, boxes, jars, and pockets. Doors and entrances are symbolic of the genital opening. The pubic hair of both sexes appears as woods or bushes; the female yoni may be represented by a treasure box, or a box of sweets. Onanism is symbolized by Aladdin's rubbing of the lamp, which brought whatever he wished. Wild animals constantly represent the sexual passions. These typical symbols appear constantly in dreams, and also in the dreams of the race—the primitive myths, fairy stories, fables, and religious writings.

The three stages of man's sexual development, Freud points out, are auto-eroticism or self-love, homosexuality or love of the same sex, and heterosexuality, or love of the opposite sex. The child discovers his own body, finds the touch of its intimate parts pleasant, and thus enters physically into the auto-erotic stage. Soon enough he is told, "Naughty, naughty!" by elder persons; but the practice of onanism, thus commenced, may continue far into life. Some men and women never pass beyond this Narcissist stage (named after Narcissus in the Greek myth, he being the youth who fell in love with his own reflection in the mirrored surface of a woodland pool).

Homosexuality, or love of the same sex, has a double derivation. It comes in part because the child, boy or girl, does not at first guess that members of the opposite sex have different sexual organs from his own. Thus the son imagines that his mother and sisters are bodied like himself; and the daughter, that her father and brothers are bodied like herself. A definite attraction toward his own sex, as an intermediate step from auto-eroticism to developed heterosexuality, also plays a part. In the childhood of the race, this custom held high honor. Sappho, held second in reverence among poets by the Greeks, advocated and practiced love with women; and Socrates, in the *Symposium,* said that love among men was the highest love attainable. Yet homosexuality is, as a function, sterile, and is, from the race's standpoint, destructive; it is an adolescent or undeveloped stage of love, rather than a high stage.

The third and final stage is heterosexuality, or love of the opposite sex—the normal culmination of love development.

Bousfield has indicated statistically the evolution of the sexual components of the normal child, in the following table:

Infant

Autosexuality	100%

Child of Twelve

Autosexuality	40%
Homosexuality	50%
Heterosexuality	10%

Normal Individual at Puberty

Autosexuality	20%
Homosexuality	30%
Heterosexuality	50%

If any one or more of these components are repressed, they may become sublimated, or expressed in a higher form—as an esteem and respect for one's self, or as a friendship for members of the same sex. If they are repressed without sublimation, as when they are said to be wrong and sinful—when excessive humility is taught, or strong friendships for the same sex taught as harmful—in many cases this produces neuroses or nervous disorders, bad habits, and the like. Even in adult years, any of these may be expressed physically.

THE PSYCHOANALYTIC METHOD

The most popular Greek myth, as the records of the dramas written by the great dramatists show, was the story of Oedipus. This was the narrative of the Theban youth who slew his father, and married his mother. The censor, in the Greek myth, added the element that the guilty mother took her own life, and that Oedipus blinded himself. This added element made the story acceptable to the consciousness; but it was the essence of the story that made it universally popular. Its essence was that a man killed his father, and mated with his mother. Social ethics calls these acts the offenses of murder and incest; and, if the stories were popular among the Greeks, and contain similar germs of popularity today, this is because many men desire to commit these two acts, at least in the subconsciousness, where the naked desires abide.

The mother, as we have seen, is the son's first love ideal. Many a boy never grows beyond this attitude: "Mother is my only sweetheart," "I'm mother's lover," "I Want a Girl Just Like the Girl That Married Dear Old Dad," the last named popular song merely phrasing the general attitude. Constant cases are given of little boys, called precocious, who said to their mothers, "When I grow up, I'm going to marry you." This same relationship extends, in slightly less degree, between fathers and daughters. The mother, often disappointed in her husband, turns to her son as her lover, since she feels she can shape him to be her ideal; he in turn reciprocates this, resenting the return of his father to the house after a journey, which dispossesses the young son from his mother's bed. Yet ethics tells him that any idea of mating with his mother is evil; and this desire is pushed down into the subconsciousness.

The resultant conflict there, which Freud calls the Oedipus complex, from the Greek story, causes countless quarrels between sons and fathers, even on remote intellectual grounds; and harms the mother, and especially the son, in many ways. The mother often influences her son subtly against any marriage; if he marries, she often spoils the happiness, or ends the marriage. The boy turns outward, to find his mother in some other woman; failing in this, for it can never be achieved wholly, he may become the typical philanderer, or bachelor "man-about-town." Or, if he sees every woman as his mother strongly enough, he may hold that sexual desire for any woman is "adultery in the heart," and in practice regress into homosexuality or auto-eroticism.

Such a common situation psychoanalysis treats, first of all, by bringing the facts to the surface; using all the evidence furnished by the subconsciousness as a guide. The son, made to realize the mother's paralyzing effect upon his life, usually elects to wean himself belatedly from her, and marry. If he continues as before, it is at least with his eyes opened.

Another frequent complex is the inferiority complex. Each child is different from every other; and a child especially different, through physical weakness, bookishness or some similar cause, finds himself increasingly left out of the childish herd or gang. As compensation for the growing sense of inferiority, he may suddenly console himself that he is superior, and not inferior; and may become a loud-voiced boaster, harming himself and boring others, in physical expression becoming the chief bully or gangster; or at times the martyrdom-seeker, enduring suffering, and indeed encouraging its coming, in order to prove his superiority. The opposite of this is the person so convinced of his superiority that he assumes subconsciously an exaggerated humility and insistence upon his lack of worth. The two are equally harmful in essence; and the psychoanalytic method, by bringing the chain of causative facts to the surface, may alleviate or entirely cure such cases.

The psychoanalytic method originated, not as a theory, but as a result of Freud's treatment of thousands of cases of nervous disorders, and by a trial-and-error method of handling them. As a science, psychoanalysis is young; the process of analysis is long and expensive, and many of the practitioners are harmful charlatans. But the immense value of the method to man's thinking process is already apparent. Among other manifestations of the subconsciousness are the products of man's so-called inspiration, such as poetry, fiction, and any inspired prose, as well as other artistic products. The critic of today and tomorrow knows that there can be no understanding of the poetry of Keats, Shelley, Poe, and the rest, without a knowledge of their lives; and that, conversely, the life is made plain only by a psychoanalytic interpretation of the art product. The story of man's life consists of two things: the things done, and the equally influential things not done, the avoided alternatives. The total effect of Freud's bringing all of this submerged sexuality to the surface and its air has had a salutary effect upon the race's thinking and morality, quite as influential as Einstein's researches in astrophysics.

Freud has explained our reactions to wit and humor as the release of resistances held against the butts of the ridicule—the first adequate explanation of this general human trait. He has carried the analysis of group psychology further than any forerunner, likening mob psychology to hypnosis, and so to the early savage horde. Man he finds to be, not a herd animal, but a horde animal—an individual creature in a horde led by a chief. This tie to the chief, usually by blood the father of the sons in the tribal horde, is the relation that binds members of a mob together, with the mob-leader in the place of the father. Mobs are reversions to man's bloody father-led racial childhood.

THE ORIGINAL INSTINCT

More penetrating than this are Freud's conclusions in the study, *Beyond the Pleasure Principle.* Seeking to find some original instinct underlying the omnipresent pleasure-pain principle, which we found present in irritability, one of the two original properties of living matter, Freud's study led him through strange fields. He is impressed by the child's insistence upon repetition of any enjoyed sensation, as of an adult's making a noise like a cow, which the small child desires to have repeated all day: "Do it again! Again!" In the merely physical world, the tendency of a rubber ball, pushed in, to return to its original position, and the tendency of a branch, pulled downward, to fly back, are examples of the same force working toward the reinstatement of an original condition from which the object was displaced. Certain dreams, he concludes, are not wish-fulfilments, but merely the desire of the subconscious to return to situations in the childhood. Hence he evolves his definition of instinct:

> An instinct is a tendency, innate in living organic matter, impelling it toward the reinstatement of an earlier condition.

All organic instincts, then, are conservative, and are directed toward reinstatement of an earlier condition; hence, all organic development is due to the external, disturbing, and distracting influences. The final goal of all organic striving then would be a return to the ancient starting point, which was lifelessness: the goal of life is death. When lifelessness became life, the instinct was implanted in it to return. The so-called preservative instincts are merely the organism's insistence that it be permitted to return to its original condition in its own way at its own time. The pleasure-pain instincts are superficial expressions of the underlying instinct to return.

One set of instincts refuses to fit into this hypothesis: the sexual instincts. Freud words the question:

> Of what important happening then, in the process of the living substance, is sexual reproduction, or its forerunner, the copulation of two individual protozoa, the repetition?

He admits that he does not know the answer; saying that the lay mind quails, and even specialists have not yet been able to solve, the origin of sexual propagation, and the source of the sexual instincts. The best answer that he can give is to quote the fantastic theory in Plato's *Symposium,* that Zeus formerly made a third sex, double, with four hands and four feet, two faces, two genital parts, and so on. Then Zeus split these beings in two, since when each human being has gone seeking its other half, in the desire to grow together again. Hence Freud assumes that, at the time lifelessness was made life, living substance was

> at the time of its animation rent into small particles, which since that time strive for reunion by means of the sexual instincts.

At this point Freud broke off.

Excessive specialization in any science or branch of a science too commonly results in a general ignorance concerning the recent achievements in other scientific fields. If Freud had known what progress biology had already made in this very matter, the answer would have come to him. In this analysis, Freud's first slip is in insisting upon the word *repetition,* instead of *return.* Thus life does not insist upon a repetition of the creation of life, but upon a return to lifelessness. Hence what life seeks, in the sexual instincts, is not a repetition of some important happening in the process of evolving life, now repeated in sexual union; but a return, in the union of elements once separated. Of course, the lay mind does not quail at the origin of sexual propagation and instincts; the cultivated lay mind understands it, for the specialists have solved it. Lester Ward, in his discovery of the procession of the sexes, has solved it.

Freud speaks too broadly when he classes sexual propagation and the sexual instincts together as the reproductive instincts. We have already learned the threefold division of these:

1. The reproductive instincts proper, a form of nutrition.
2. The conjugating instincts, of sexually undifferentiated cells.
3. The sexual instincts, of sexually differentiated cells and organisms.

These must be taken up separately, for the conditions to which each is a return differ sharply.

1. The reproductive instinct is a part of nutrition, and its accompanying growth. To maintain that fluidic irritability called life, the organism must take in certain substances from the environment, in the process called nutrition. These become temporarily part of itself. The prior state was of the organism existing without them. Hence the organism has the instinct to eject them, to return to its prior state. Part goes forth as excrement; part goes forth in reproduction. Thus the organism, in reproduction, pushes that out of itself which was not always part of itself, to secure a return to that period when it existed without the elements ejected.

The identical elements, of course, are not always ejected; just as the organism that arrives at death is not the organism that commenced life, in every detail. But the dominant principle is the same.

2. The instinct toward compound conjugation, the union of cells not sexually differentiated, is a striving to return

> to an earlier condition. These cells and organisms were produced out of other cells and organisms by means of asexual reproduction—division, budding, or some more complicated method. The two cells that split, the mother cell and her budding daughter cell, were once united. So the instinct for conjugation of the sexually undifferentiated cells is for a return to the state before the division or budding took place.

The third, the sexual mating, is the one which most troubled Freud; and the answer to it is clearest of all.

> 3. The instinct to unite sexually is an instinct to return to the condition at the time just before sex originated. The male started as a fertilizing adjunct to the body of the female. At about the stage of the barnacles, the separate male developed on the female's body. Its instinct was to reunite with the female's body, the body of its creating mother. The female's instinct is to reunite with the male it bore.

Thus the sexual instinct, as well as the reproductive and conjugating instincts, illustrates the vast underlying instinct to return, as surely as do the pleasure-pain instincts, and the preservative instincts. The early female produced her male mate out of her own body, and thereafter mated with him. When he was separated bodily from her, his desire was to return, as a child's dim desire is to return to the eternal peace and rest of the mother's womb. The mother produced, among the barnacles, her son, as her first mate. Sexual intercourse at first consisted of the union of mother and son. The father at first had not existed; the mother had produced the separate male out of her own body. The whole love of the son, as of Oedipus for his mother Jocasta, was for the female who was at once his mother and his actual or potential spouse. When this is understood, it is not surprising that the Oedipus complex, the desire of the son to mate with his mother, is still strong in human life. The sexual life of living organisms began with this relationship.

In criticising the stricter Freudian theories, psychologists point out that they err in making all mental life too simple:

in reducing all activity to love activity, with an expanded definition of love. The researches of other psychoanalysts are slowly correcting this. The behaviorist psychologists, under Watson, seek to reduce mental life to a different simplicity. From birth, various associations are built up, concerned with the desired love object: the girl loves moustaches because her father and her leading screen hero wore them; she hates blue neckties because the grocer's boy always wore them. The father and mother are the original patterns, as a rule, for these associations causing tumescence (actual bodily secretions, leading to the unfolding of the instinctive reproductive and sexual mechanism) or its opposite, detumescence (inhibition of secretions, which, if not inhibited, release avoidance movements). Watson holds that these love and do-not-love factors are at the bottom of home, general, social, and vocational life. There is essential truth in this, when physical behavior is not entirely substituted for mental behavior. But it is too simple, lacking the scientific comprehension of corrected psychoanalysis.

Is there any way of measuring the comparative potentialities of mind? Scientists are groping toward such a measurement, with countless intelligence tests. The most trustworthy set of tests are the Stanford-Terman revisions of the Binet-Simon intelligence scale. These tests (ranging from the third year, through the "superior adult," presumably of twenty years) are based, not upon book learning, but upon native mental ability. As a practical thing, they work. The intelligence quotient (the comparative score of the person tested, measured against the average intelligence of people of the same age—referred to as the I. Q.) of a child, tested at the age of 3, remains fairly constant at 10, at 16, at 20. Roughly speaking, a child whose I. Q. is around 100, representing the mere average intelligence through all the land's children of the same age, can not take advantage of educational machinery higher than the grammar school. An I. Q. of 100–110 indicates that the child should finish high school. An I. Q. of 110 and higher promises that the child should be able to finish college.

This does not show whether the child should be a machinist, a pianist, an insurance salesman, or a preacher. Tests of a delicacy sufficient to indicate this have not been devised, and probably will not be. The method of trial-and-error is the only one here; and the opportunities for testing one's capabilities, by easy change of profession, should be made general. For the rolling stone will roll, in the most rigid system; nor does moss benefit it. And the steady climber will climb, in any system; but the rigidity can make the climb harder. Only actual experiment in life can determine what social hole fits the peg best. The child with the highest intelligence quotient may end up as an accomplished forger or murderer. But, as we shall see, the development of mind by education in facts and methods of perceiving their relationships is man's most hopeful method of equipping the men and women of tomorrow with the ability to grow freely to their high capacities.

The average mental age of the people of this country, psychologists have established, is about that of a 12-year-old child. This is one of the explanations of the shrewd use of dishonest propaganda, in controlling the psychology of the crowd. The immense value of a publicity staff, to direct public thinking, is realized in every industry today; and perhaps its most efficient utilization has been during wartime. Each nation has its corps of publicity experts, who scatter stories to the discredit of the enemy, and to the credit of the one who pays them. The news is doctored, reverses and disasters minimized, good luck or achievement exaggerated, until the public yields to the tremendous pressure. Newspapers as now published, as well as magazines, largely disseminate opinions in the guise of news, as well as opinions on the editorial pages; and the opinion masquerading as news is far the more harmful. Man will reach the stage where some means will be provided for the dissemination of uneditorialized information, telling the truth as man sees it, rather than emotionally warping his mind to suit the will of some shrewd director of public thinking.

ADDITIONAL READINGS

Psychology. A general survey of the field is *Introduction to Psychology,* by R. M. Yerkes (New York, 1911).

Psycho-Analysis. The most readable explanation of this subject is *Psychanalysis,* by A. A. Brill (Philadelphia, 1914); although an allowance should be made for extreme pro-Freudianism. The *General Introduction to Psychoanalysis,* by Sigmund Freud (New York, 1920), is complete, but is written awkwardly and ponderously. *Beyond the Pleasure Principle* and *Group Psychology and the Analysis of the Ego,* both by Sigmund Freud, are well written and brilliantly conceived.

Behaviorism. *Psychology from the Standpoint of a Behaviorist,* by J. B. Watson (Philadelphia, 1919), is the clearest phrasing of this school of thought.

Intelligence Tests. *The Measurement of Intelligence,* by Lewis M. Terman (Boston, 1916), is the classic handbook of the revised Binet-Simon tests.

7. *Sociology*

THE DATA OF SOCIOLOGY

The youngest and highest of the sciences (highest in the sense that it deals with the most complicated phenomena) is sociology. Lester Ward defines this as the science of society, or the science of social phenomena. Benjamin Kidd sought to limit this to the science of human society; but facts dislike limits, and the roots of human society dig deep into earlier group relationships. Society may be defined as organisms living in groups; and a group in this sense means any more than one. Sociology may then be defined as the science of living organisms in their group relationships.

Sociology includes many special social sciences, such as:

Archeology, the science of antiquities.
Demography, the science of vital and social statistics.
Economics, the science of wealth, its production and distribution.
Ethics, the science of conduct and character.
Ethnology (including ethnography), the science of the racial classifications and minglings of men.
History, the science of the recorded actions of men.
Jurisprudence, the science of law.
Philology, the science of language.
Politics, the science of government.
Technology, the science of the industrial arts.

All of *The Outline of Man's Knowledge*, except the preceding sections of Book II: *The Outline of Science*, is merely special developments of branches of sociology. The studies of history, literature, art, religion, and philosophy, are merely studies of the group relationships of living beings, primarily of men.

Science was long based upon a belief in the universality of causation: that each effect was produced by its appropriate cause. Recently it has moved from this belief to an understanding that the relationship is merely apparent. The data of all sciences are made up of apparent causes and effects. From this standpoint, a true science is a field of phenomena occurring in apparently regular order as the apparent effects of natural causes, such that a knowledge of the apparent causes renders it possible to predict the apparent effects; together with systematic reasoning about such phenomena. The reality behind the cause and effect relationship is that such phenomena appear regularly in an apparently definite sequence. Beyond that, science does not go.

In the sciences dealing with more complex phenomena, the quality of exactness is only perceptible in the higher generalizations. The method in sociology, as in all sciences, is generalization from observed facts. The phenomena of sociology are in sight all the time. The facts that the sociologist must use are spontaneously supplied to him every moment, and everywhere. If he travels through all lands, he will find the same basic facts; his discoveries are only auxiliary, and valuable for comparative study. For instance, in anthropology we find on every hand what Tylor calls ethnographic parallels, the occurrence of the same or similar customs, practices, ceremonies, arts, beliefs, and even games, symbols, and patterns, in peoples of nearly the same grade of culture, at widely separated regions of the globe. This indicates that there is a uniform psychic and social development of mankind at all times, under all circumstances, differing only in the varying emphasis caused by such natural causes as climate and topography. If we continue to rise in the process of generalization, we ultimately reach a plane on which all mankind are alike.

Even in civilized races, there are certain things common to all. The great primary feelings and wants are the same the world over. Political organizations seem to differ greatly, but there is much more agreement than difference. Creeds, cults, and sects multiply into utmost apparent many-ness or heterogeneity; but there is a common basis even in belief. The passions of men are as uniform as their wants: acts growing out of these passions, regarded as destructive of the social order and condemned by law and public opinion, are committed in the face of these restraining influences everywhere with astonishing regularity. Murders and assaults induced by sexual passion vary with seasonal regularity everywhere; the sociologist can not name, as the year begins, the inevitable offenders of the year to come, but he can predict with astonishing accuracy the exact number, month by month, of such offenses. Statistics, or collective mathematical generalizations covering large groups of human beings over wide areas, prove that these are as uniform, though not as frequent, as the normal operations of life.

Sociology is an abstract science, in that it does not attend to details except as aids in arriving at what is called the law that underlies them. This has been called the historical perspective: it is the oldest of all sociological conceptions. There is another underlying law which contains the key to group activities: the law of parsimony. In the field of economics, this is worded as the law of the greatest gain for the least effort. It is, for example, perfectly safe to assume that under any and all conceivable circumstances, a sentient, and especially a rational being, will always seek the greatest gain, or the maximum resultant of gain. This is based on the pleasure-pain principle, which Freud resolved back into the instinct to return. Life is necessarily selfish: variants, in the direction of unselfishness, are eliminated by the conditions of existence. Yet the right conception of selfishness must be grasped: actions believed to be altruistic are merely sacrificing a present to a future advantage or a lower to a higher satisfaction.

The subject matter of sociology is human achievement: not what men are, but what groups of men do. The animal world, properly speaking, achieves little. It may work changes, more or less extensive, in the face of nature; but this is merely the incidental result of activities which do not have any such effect for their object. The two divisions of sociology are,

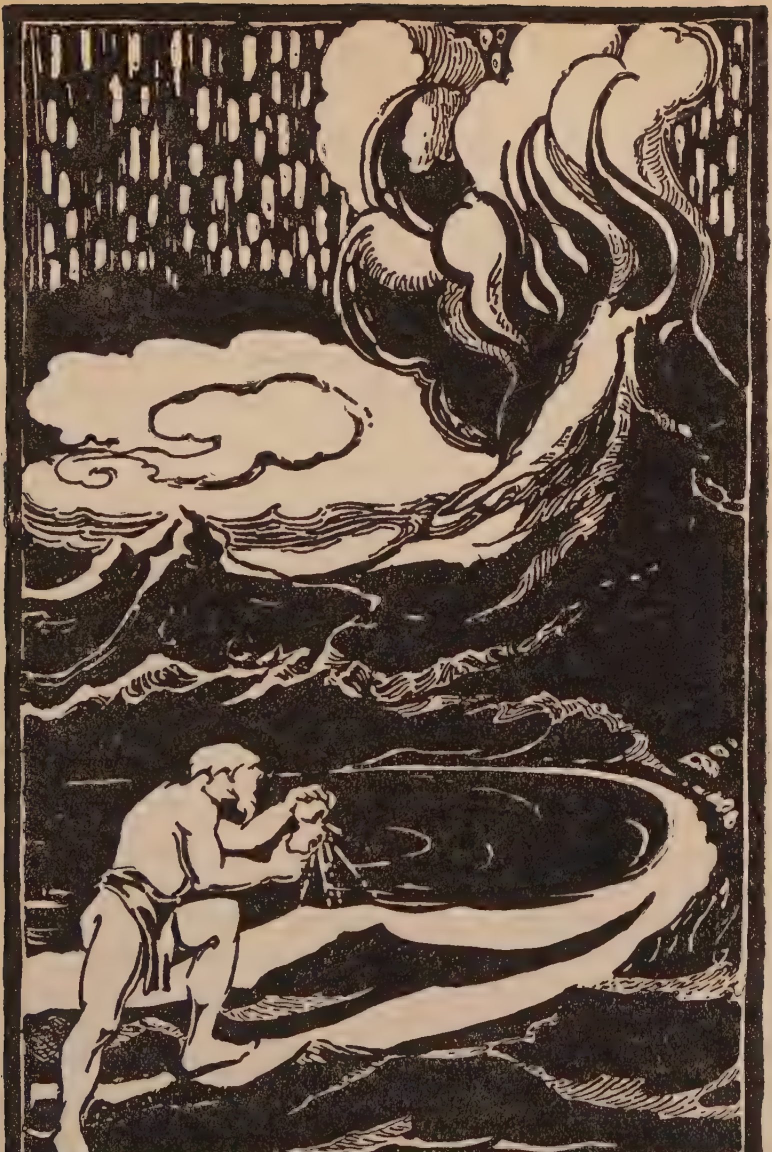
The natural history of man.
The history of man's culture.

In its broader meaning, culture includes everything which may be classed under the head of human institutions. The several stages of culture,

Savagery (from the beginning through the invention of pottery)
Barbarism (from the invention of pottery through the invention of a phonetic alphabet), and
Civilization (the period since the invention of a phonetic alphabet)

are so many steps in the progress of what is called civilization, in the more popular meaning of the word. The broad generalization which differentiates man from the subhuman world is that the environment transforms the animal, while man transforms the environment. In a wider sense, man's transforming activities are themselves secondary products of the environment that has produced him.

There has been no important organic or bodily change in man during the historic period. Yet man's power of vision has been enormously increased by the applications of the lens; his power of locomotion has been multiplied by the invention of propelling machines; his strength has become almost unlimited, by calling the resources of nature to his assistance. Tools are vastly more effective than teeth or claws. In the electric transmission of thought across continents and oceans, man has developed an organ of which no animal possesses an apparent rudiment. Man has enormously increased the production of life's necessities and luxuries, through a long series of inventions—all a result of what may


Louis Bromberg

Rein the volcano in a spark,
Waken dark rocks to end the dark,
Harness the flame, the wind, the sun,
To uprear civilization.

superficially be called man's power to transform the environment. The artificial modification of natural phenomena is what constitutes achievement.

THE OBJECT OF CIVILIZATION

Material civilization consists in the utilization of the materials and forces of nature. The spiritual part of civilization is at least conditioned upon material civilization; without a material basis, it could not exist. It is a flower so delicate, that it can only bloom in the rich soil of material prosperity. The spiritual part of civilization is rooted in leisure; and leisure is a product of material prosperity.

And yet achievement does not consist in material goods, or wealth. Involved in the idea of achievement is that of permanence: material goods are perishable; most goods, of course, being consumed at once. Achievement in reality consists in methods, ways, principles, devices, arts, systems, institutions: all these may be summed up in the word inventions. Every such increment or increase to civilization is a potential permanent gain, because it may be imitated, repeated, perpetuated, and never lost. Language itself was an achievement of tremendous importance; literature and art have become two of the great achievements. Philosophy and science, the invention of tools, instruments, missiles, traps, snares, and weapons, are achievements crowned by an age of machinofacture, artificial locomotion, and electric intercommunication. There are also tools of the mind—arithmetical notations, the industrial arts, and the vast protective achievements of man, such as military, political, juridical, and industrial systems.

The fundamental condition of achievement is social continuity. Some races have little or nothing to contribute to the general stream of social culture. Thus sociology deals mainly with the historic races, because there alone is social continuity. The essential characteristic of all achievement is some form of knowledge. This can not be transmitted by heredity, but must be acquired anew by every member of society, and thus handed down to later generations.

Natural creation differs from man's creation, in that the former does not proceed from a purpose, or an ideal. The mode of producing effects is, in the case of feeling, striving; in the case of intellect, purpose. Feeling constitutes the propelling agent in animals and in man. In associations of men, it is the group force. To say that feeling and purpose existed in the universe before life and brain existed is as false as to say that houses exist in a bank of clay, out of which bricks may be made. The feelings had a much earlier origin than the intellect; during a prolonged period they constituted the only mental manifestations, and do so still throughout practically the entire animal world below man. One of the inherent qualities of feeling is that it seeks an end. This desire for some end is a force, and impels to action; it is the mental motive to action. In common speech, the mental motive is simply desire. The collective desires of associated men are the social forces.

Desire is a sensation; though it must be regarded as an unpleasant sensation. Until the desire is satisfied, the sensation must be regarded as disagreeable. If it were agreeable, the effort would be in the direction of continuing it, not of terminating it. Desire is therefore in the nature of pain. The satisfaction of desire is pleasure. Considering the number and variety of desires to which man is subject, and the fact that the majority of them are satisfied sooner or later, we may form some idea of the amount of pleasure thus yielded. This constitutes the great bulk of what makes existence agreeable and bearable. If the relative amount of unsatisfied desire exceeds that of satisfied desire, we have a state which Patten has characterized as a pain economy; if the reverse is the case, we have a pleasure economy. All social progress consists in a movement from a pain economy toward a pleasure economy.

The stronger, more conscious and often violent desires are primarily hunger and love. The former appeared at the beginning of life; the latter, somewhat later. These are the chief mainsprings to action: all other desires are in general directly or remotely derived from them. They are as strong in man as in the lower animals, and in the higher types of man as in the lower types. In society they become the chief social forces, and the foundations of sociology.

The object of nature, as far as this may be observed from its workings—or, to word it more accurately, the tendency of nature—seems to be to convert as large an amount as possible of inorganic or lifeless matter into organic or living matter. Since life is merely a complicated chemical unrest, it is as if nature, at the stage of life, went through some such unrest as a liquid boiling, with the observed tendency to have a constantly increasing amount of its surface subject to this unrest. The feelings, based upon pleasure and pain, to serve the function of nature, in preserving and spreading life, began to be sought by the organisms as ends in themselves. To check this, came natural selection, which Lester Ward calls the elimination of the wayward. Instinct in the animal world, and reason in man, were developed to check this tendency. Reason took the form of counteracting the pursuit of dangerous pleasures, by the fear of greater pains. It also elaborated a system of social control provided with coercive or forcing machinery, so as to hold refractory members of the social group in check. This whole instinct, or group sentiment of safety, developed into religion, law, and government. Further intellectual development, and wider knowledge and wisdom, may ultimatly enable man to dispense with all social restraints against unsafe conduct; but the world is still far from this ideal.

Optimism is the normal attitude of all sentient beings. No other attitude is possible in the animal world, or in any type of mankind that has not reached a high degree of intellectual development. Natural, spontaneous, or impulsive optimism is a healthy social influence. The moment the light of reason is turned upon this surface optimism, however, it withers and decays. As reason penetrates toward the dark reality, it ends in pessimism, or the doctrine of despair. There are some who claim to probe still deeper: and claim that science, and especially social science, points ultimately toward neither optimism nor pessimism, but toward meliorism, or the harnessing of all social forces in orderly effort toward some supreme social end.

The social forces are classified by Ward thus:

- Social Forces
  - Bodily Forces
    - Preservative
      - Positive (seeking pleasure)
      - Negative (avoiding pain)
    - Reproductive
      - Direct. Sexual and amative desires.
      - Indirect. Parental and kinship affections.
  - Psychic Forces—Sociogenetic
    - Moral, emotional (seeking the safe and good)
    - Esthetic (seeking the beautiful)
    - Intellectual (seeking the useful and true)

A deep-rooted law of sociology is that, while function remains constant, feeling increases in proportion to development. In the progress of life, the capacity for both pleasure and pain increases with the advance in structure. The primitive man is relatively indifferent to pain; living chiefly in the present, he does not suffer the acute pains which a developed imagination enables the more refined organizations to represent in advance to the mind. Civilized man has more sensitivity, both with regard to pain and pleasure. Primitive man feared nature; civilized man has lost this fear, but has as yet no comprehension of the social forces, much less any thought of controlling them. It is the function of sociology to explain these, that they may be rendered harmless, and ultimately converted into the servants of man, harnessed to the on-going steam-roller of civilization.

THE PRESERVATIVE FORCES

When we turn to the preservative forces, we note first that all social processes that are called economic rise in exploitation. This consisted first in the use of the bodies of captured savages for food, by their savage conquerors. Social assimilation through conquest and subjugation followed this, slavery originating from the conversion of conquered warriors and women into a servile class. Slavery, arising only where the slaves could produce more than their own necessities, was an improvement upon extermination and cannibalism.

Economists are agreed that all value, in the economic sense, is due to labor. Labor was not an original function of man; the pursuit of food by savages can no more be called labor than the grazing of a buffalo or antelope. At the next higher stage, where women did the camp drudgery, labor had not yet become a habit. It was the institution of slavery that taught man to labor. The motive was not the desire to enjoy the fruit of the work; it was the fear of the lash. Property is unknown to animals; when it came into being, it was regarded first as communal; a man's flaked flint tools were regarded as the property of the tribe. Slaves were the first private property, and then the conception of ownership of land arose. Property, in the sense of useful commodities in excess of immediate needs, requires the protection of law, and the power of the state. Next to personal safety, the first and most important function of the state is to guarantee the security of rightful possession. Property contributed to social development, by furnishing an incentive to accumulation. It then became the basis of exchange, of trade, of commerce, of industry and business. It became an end, and was sought for as such. It assumed the character of wealth; the pursuit of wealth became the supreme passion of mankind. To this the material civilizations of the great historic races are chiefly due. As a factor in human achievement, this superpreservative social force, the love of wealth, has had no rival.

The production or creation of property has reached, in modern civilized communities, a stage of increasing efficiency. The distribution of property thus created, in order to permit men to consume it, is, on the whole, socially mismanaged. The exploiting classes are still able to hold far more than they deserve or need, while the exploited classes suffer deeply from an undersupply of the wealth they have created. This is socially unfortunate, in view of the importance of resultants of consumed wealth. Ample nutrition, for instance, is essential to mental superiority, although it by no means insures the latter. Adequate protection from the elements tends in the same direction; leisure cooperates with these to develop the faculties and perfect the man. On the other hand, compulsory exertion, in the form of excessive and protracted labor, blunts and stunts all of the faculties, and tends to produce a deformed and distorted race of men. Both of these forces have been at work from the early stages of society; this is abundant cause for the observed mental and physical inequalities of men. It is for the future to solve the problem of the distribution of wealth, as of achievement, in order that social groups may better themselves.

THE LOVE FORCES

We have traced the procession of the sexes, from asexual reproduction, through the female's production of her own mate on her body, and her gradual development of him, through sexual selection, to the height the male has attained in certain developed forms of life. While female rule continued, as among animals and primitive peoples, the female selected her mate; and, when several males sought her, she ordinarily chose the most satisfactory of them. Man's development of the reasoning faculty, and his recognition of his kinship to the child, with the subsequent enslavement of child and mother, overturned this long period of female selection, and permitted him to select his own woman or women.

When a man pursues several women, he mates, not with the swiftest of them, but with the one with whom he first catches up—the slowest, the least worthy. Multiply this difference many billion fold: and you begin to understand woman's backwardness as a sex. The human stock was bred down, as a result of male selection. The female was bred toward beauty; toward weakness, in order that the male could possess her more easily and absolutely; and toward imbecility, since man did not seek in her intellectual contact, which might reveal his own mental limitations, but merely satisfaction of his sexual desires. Woman is today passing out of her centuries of subjection, into an equality of opportunity in the educational, industrial, cultural, and artistic fields; she is, most potent of all, securing an economic independence, a joint control over the purse-strings, in which lies power. The tendency is that the future will witness a culture ruled jointly by woman and man.

The love forces are:

1. Natural love.

This is implanted more strongly in the male, to insure fertilization of the female. This is still found in full strength even in highly developed individuals and peoples. Its purity, now sullied by illusions that the body is vile, will ultimately be recognized by all enlightened minds. Marriage systems (originating in conceptions of the enslavement of women) are modes of regulating this force. It may be perverted by such customs as a celibate priesthood or abstinence, the latter leading frequently to that strange exaltation called mysticism. It is a social necessity, and also an individual necessity for a complete development of the individual.

2. Romantic love.

This is satisfied by the presence, instead of the possession, of the beloved. This was unknown to primitive races and classic civilizations, and originated during the dark feudal ages, with their enforced absences for long periods of the marauding knights. The absences increased woman's power, and the change led toward the modern emancipation of women. The influence of romantic love upon society is great, since it stimulates a majority of the race at the period of greatest efficiency, and thereby causes great changes in the environment.

3. Conjugal love.

This grows out of the last, but differs greatly from it. It calls for qualities of heart and head, surviving after the storms of passion have passed away. Its social force is tremendous, inspiring the creation of the modern family. The ideal mating, based upon physical or natural love, requires the continuing presence of all three forms.

4. Maternal love.

This is organic, and implanted in the physical constitution, as a condition to the preservation and advancement of the race. It is shared by almost all mammals. It is an essentially conservative principle, useful as a stabilizer of society. Normally, it should end with the coming of puberty in the offspring. Modern children are withheld from weaning, mentally and spiritually, to their own constant hurt.

5. Love of kindred.

This is probably exclusively a human attribute. It includes parental and filial love. It broadens ultimately into love of country, or patriotism; love of mankind; and this may in the end thin out expansively into a love of nature and the universe.

THE MORAL AND ESTHETIC FORCES

First among the psychic forces is morality, divided into:

1. Race morality.
2. Individual morality.

Race morality is the group sentiment of safety, already referred to, out of which came religion, law, government, and the custom or *mos,* from which the word morality comes. The essence of race morality is restraints on conduct hostile to race safety. "Duty" becomes conduct favorable to race safety. Virtue is an attitude of life and character consistent with the preservation and continuance of the race; vice is its reverse. Thus the pleasure or pain of an action is not considered. Whether race morality still secures race safety is a disputed question; it may be only a social vestige, having a somewhat pathologic or diseased character.

Individual morality is based on pleasure or pain to the individual, and often conflicts with race morality. In its attitude toward others, it consists in a broadening altruism, which is in essence selfish. To highly advanced natures it becomes clear that the conflict between race and individual morality may disappear, the highest race morality being the freest development of the individual's morality.

We have seen the origin of the esthetic faculty as a by-product of female selection of her mate. Its three stages are,

The receptive,
The imitative,
The creative.

Apes stop with the imitative. The highest stage embodies ideals in visible form, and is called art. It becomes a social force. From the earlier method of imitating nature, as photographically as the early artist achieved, came the conventionalization of nature, or the smoothing of natural irregularities into a formal unnatural pattern; and this is blended today with a return to the reproduction of nature as it is, in some permanent artistic form. Literature was in its nature esthetic and not utilitarian; action came before words, poetry before prose. Only during the 19th century has it adopted generally the function of conveying thought.

THE INTELLECTUAL FORCES

The intellectual forces are the first to rise above the stage of emotions, since they deal with an interest residing in the organ of thought. The intellectual interest is also a feeling, its satisfaction being attended with definite pleasure. The mind has three chief interests,

1. To acquire knowledge.
2. To discover truth.
3. To impart information.

The first is the most intense, partaking of the nature of a true appetite. It is normally most prominent in the young. After the mind is stored with facts, largely unrelated, it begins to work upon these. The process of combining truths to form new truths is called generalization. The power of generalization constitutes the best measure of intellectual power. In this use of the word "truth," it means no more than apparent relationships.

The last aspect of the mind might be called its reproductive aspect. Voluntary teaching, professional teaching, lecturing, and authorship, are forms that this desire takes.

No one of these three interests exists in the savage; even in the lowest aspect of the first, or mere curiosity, the lowest savage has no share. The force that was most active in preparing the receptive brain was the caste system, and the creation of a leisure class. Democracy requires the assimilation of a vast body of less developed minds; but in the long run it increases greatly the number of developed minds.

NATURE AND MIND

These forces constitute the dynamic forces of society, which seek their ends directly. There is also the directive force, which seeks it indirectly, or through means. The method of mind, constituting the directive force, is the precise opposite of the method of nature. The method of nature, with unlimited resources, is to produce an enormously redundant supply, and trust the environment to select the best. The survival of the fittest involves the sacrifice of the great majority; it is therefore in a high degree wasteful. Nature aims only at success; and success is attained through a multiplication of chances. All natural growth processes are characterized by the same wasteful prodigality. The economy of nature is the absence of economy. The only true economy is purposive. Only mind knows how to economize. Economy is possible only through foresight, or prevision; mind sees the end, and pursues it. In purposive action, the waste is reduced to the minimum, for the given state of knowledge, with the prospect of progressive reduction as science and skill advance. Intellectual phenomena are far more rapid than natural. It required millions of years to produce an organic structure; less than a century has borne and matured the steamship, the railroad, the telegraph, telephone, radio, and phonograph. It must be repeated that mind is an attribute of the creature, not of the creator; it occurs only at the end of the series, and not at the beginning.

The objective faculties grew out of the subjective. The intellect was born as a servant of the will, a means to the attainment of the end of the feeling organism. Its purpose was not to restrain and curb desire, but to lead it to success. The mind's method is deception. Hunting and herding illustrate this, as does the exploitation of men. Races and classes held subject are taught, by religion and all social forces controlled by the exploiters, that they are by nature inferior, and must welcome the "lot to which God has called them." In warfare, deception is called strategy; in international relations, diplomacy; both are regarded as moral and upright.

Nor is there malice in this universal deception and exploitation; the end is the sole consideration, and justifies the primitive means.

The exploitation, we might almost say deception, of inanimate nature requires a high development of the purposive faculty. Material things do not move of themselves; their properties are hidden, and must be searched for. Physical forces are invisible and intangible, and their utilization is an exclusively human power. The end toward which mankind is tending is *the socialization of achievement:* the removing of achievement from the hands of the limited group of exploiters, for the general benefit of society. The state, limited at first to controlling actions harmful to the state, began later to punish offenses against individuals; and has now grown to a collective process limiting individualism in countless ways. In place of prohibitive legislation, we begin to see attractive legislation, which rewards rather than punishes.

THE SOCIALIZATION OF ACHIEVEMENT, OR KNOWLEDGE

Civilization, collective and individual, depends upon knowledge. Many inhabitants of civilized lands are still savage or barbarous, in that they have not assimilated the civilization about them. To lessen or end its criminal and pauper classes, society must ultimately recast its educational methods, so as to extend the benefits of social knowledge to all classes alike. It is the collective state, not private and ecclesiastical institutions, which must take this step.

Men, collectively and individually, pass through three stages, as Comte pointed out:

1. The superstitious or religious stage.
2. The metaphysical or philosophical stage.
3. The positive, or scientific stage.

Any man in the first or second of these stages is still below the highest attainable development.

Such a system as a celibate clergy, preventing certain of the most learned, civilized, and gentlest of men from sharing in reproduction, as Galton pointed out, brutalized the breed of our forefathers. De Candolle has listed a few of the distinguished men who are children of Protestant clergymen, and who would not have existed if the Protestant Church had continued clerical celibacy. Among these are:

Agassiz, naturalist.
Addison, essayist.
Berzelius, chemist.
Samuel Butler, novelist.
Encke, astronomer.
Emerson, philosopher.
Euler, mathematician.
Hallam, historian.
Hobbes, philosopher.
Jenner, physician.
Lessing, writer.
Linnaeus, naturalist.
Puffendorf, juriconsult.
Jean Paul Richter, writer.
Sismondi, historian.
Swift, critic.
Ben Jonson, dramatist.
James Thompson, poet.
Wallaston, chemist.

The percentage of genius and talent, from various social classes in certain typical districts in France, Odin discovered to be as follows:

	Genius	*Population*
Nobility	26%	1%
Official class	30%	3%
Professional class	23%	6%
Bourgeoisie	12%	10%
Manual labor	9%	80%

In the end, aghast at the revelation of the statistics, Odin cried, "Genius is in things, not in man"—meaning that genius resides in the material environment. This is a misvision of the fact that a hostile environment throttles genius, as adequately as could a thug. These figures demonstrate that a person born in the noble class has exactly 200 times the chance of becoming eminent, as a person, of exactly the same gifts, born in the laboring class. The manifestation or social expression of genius is almost wholly a question of opportunity. As for the part education plays in the production of genius and high talent, of 827 men of undoubted eminence,

811 were well educated.
16 were poorly educated.

The man denied education is denied in advance any genuine chance of achieving eminence; and the race is robbed correspondingly.

From Odin's purely mathematical study of genius and eminence, Ward arrives at the conclusion that a well organized system of universal education would increase the social effectiveness of genius at least 100 fold. Instead of 2 of the great and eminent to every 100,000 of population, we could have 200. Society's present organization callously and calmly kills off 198 out of every 200 potentially great men and women. Among corroborate expressions are those of Liebnitz, "Education conquers all things"; of Helvetius, "Education can do all things;" of Mazzini, "Without education, you are incapable of rightly choosing between good and evil; you can not acquire a true knowledge of your rights; you can not attain that participation in political life without which your complete social emancipation is impossible; you can not arrive at a correct definition and comprehension of your own mission;" of Kant, "In education lies the great secret of the perfecting of human nature;" and lastly, of our own Thomas Jefferson, "If a nation expects to be ignorant and free in a state of civilization, it expects what never was and never will be." The method of social progress is education; education of the man and woman, no less than of the child.

Even physical life depends upon education and wealth. Statistics carefully compiled by Mulhall, Conrad, Casper, and Booth, indicate that the average longevity of the rich is from 55 to 56 years; that of the poor, 28 years. The mortality of infants in Germany in noble families is 6%; that of the poor, nearer 35%. Apologists for the world as it is shrine our social state of ignorance as the best possible condition in the best of all possible worlds. Timid reformers like John Stuart Mill find the remedy, not in an activity of the exploited, or an action by society generally, but in the quickening of the sympathies of the wealthy, by a contemplation of social ills. Herbert Spencer went no further: an appeal to benevolence was the fruit of his system. And yet the flea does not weep at the blood-toll from the dog; nor does the typhoid germ succor the flesh it feeds upon. We need not wait, with Spencer, for the slow transformation of human nature; the easy transformation of human institutions, particularly those of education, will easily, and with comparative rapidity, bring about the desired amelioration.

Ignorance enslaved is like an unvented volcano, or a dammed mountain-current in thaw-time. Pompeii and Herculaneum, thriving fields and villages inundated and swept away in a swirl of raving waters, these should not be forgotten. We need not look further than the France of 1789 or the Russia of 1917 to glimpse what moves under the surface of the concealing human sea. For their own sakes, that what rights and opportunities they have should remain theirs, and not go down in a red bath of blood and a holocaust of destruction, it is well for the dominant industrial world and its advisers to see the flame and the flood, before they are so visible that blinded sight is impotent. There are wiser ways than sowing the whirlwind and the deluge. Education, the spread of knowledge, is society's one hopeful way, and the truth, and the light.

PHILOLOGY: THE SCIENCE OF LANGUAGES

The branches of sociology, some of which have already been listed, take up special aspects of group relationships, and study these in exhaustive detail. We might consider here ethics, economics, jurisprudence, ethnology, or any of the others; but the general development of these has already been sketched in Book I: *The Outline of History;* and ethics will return in the studies of religion and philosophy, in Books V and VI. Let us, instead, as a type of the lesser social sciences, close this survey of science with a glance at the science of language, which will lead us into the flowering of language in literature.

Psychology has established that the vocabulary of the average superior adult contains only 13,500 words; a recent dictionary of the English language contained over 500,000 words. Mathematically, in the case of an alphabet with only 23 letters, these 23 letters, arranged in every conceivable combination, would give us more than 25,852,016,738,889,976,640,000 words. Add to this the Chinese trait of intoning the same sound at a different pitch, to indicate a change of meaning, and the number would be beyond computation. The syllable *dai*, in the Chinese speech of Annam, signifies 23 different things, depending upon its pitch and accent. The sentence

Ba ba ba ba

is said to mean, if properly pronounced, "Three ladies gave a box on the ear to the favorite of the prince." Yet this bewildering multiplicity of words came from a far smaller number of original word-stems, or roots. Max Muller lists 121 original Sanskrit roots, which lie at the base of all Indo-European languages. There was a Doctor Murray who imagined he could derive all our language from nine roots, AG, BAG, GWAG, DWAG, LAG, MAG, NAG, RAG, and SWAG; an even more thorough-going Doctor Schmidt traced the whole Greek dictionary back to the root E, and the whole Latin vocabulary back to the root HI. Let us do a little word digging for ourselves.

English speech has borrowed from nearly every speech existing on the globe, and from many dead languages. The original Celts or Britons, pushed into Scotland, Wales, and Ireland, and annihilated elsewhere, contributed such words as *bin, brat, crock;* later the Welsh gave *maggot, flannel;* the Scotch *clan, slogan, whiskey;* the Irish *bog, galore, shamrock, Tory,* and a few others. Then came the Teutons (Angles, Saxons, and Jutes) with their imported *Englisc* (later English) speech. A few of their words survive without change: *oft, and, in, word, full, from, for, to, God.* Most of the words persist with changes in meaning. Thus *wadan,* to advance, became *wade,* to advance in water; *spillan,* to destroy, became *spill,* to waste liquid; *craeft,* force, became *craft,* cunning. The first of these three shows how words become specialized in meaning, even as men become specialized in industry; the second shows the general tendency of words to become less impressive, as time corrupts the original force; the last points to historic fact that cunning succeeded force in the dealings of men. At times the Christian religion dictated the change, as when *feond,* enemy, grew to be *fiend,* devil; and *bletsian,* to consecrate by blood (compare *bleed, blood*) became *bless. Bread* (once a portion of bread) and *loaf* (once *bread* collectively) have exchanged meanings; the original meaning of loaf appearing in *lord* (*hlaeford,* bread-guardian) and *lady* (*hlaefdige,* bread-kneader).

When the Normans conquered England in 1066, they ended the *Englisc* speech. French and Latin became the court languages; the reaction did not come until about the time of Chaucer, when English, greatly modified by French-Norman elements, swept upward from a dialect of subject peoples to be the language of the island again. Climate played, as always, a large shaping part in the evolution of speech. Man's speech is determined by isothermic lines, or lines of equal temperature throughout the world. Study your map for place-names, as samples of the spoken language. The harsh Siberian and Russian *Yakutsk, Okhotsk, Tobolsk,* and the Scandinavian *Bukke Fjord, Sundsvall, Laurvik,* correspond to the explosive Eskimo gutturals, and to *Umanak, Svartenhuk, Sukertoppen, Attumwapiskat, Winisk,* names modified by southerly settlers. The guttural Teutonic speech is similar to the American *Connecticut, Massachusetts, Andrascoggin, Umbagog, Squam, Keokuk, Iskut.* The melting softness of Italian, southern French, and Spanish, finds its American parallel in *Miami, Pensacola, Tuscaloosa, Tuscarara, Susquehanna, Appalachicola,* and the like. Equatorial speech is broadly similar the world around; the southern hemisphere builds back from a lazy sustained softness to a curtness and at last a staccato brusqueness, as we approach the frigid southern pole. Civilized conquest of the world imports inept and inappropriate place-names everywhere; but the original speech was determined by the close-mouthed cold and the languid drawl of the tropic warmth; and importations in word usage slowly are corrupted by these omnipresent forces.

The English language has been said to be French badly pronounced. There is some truth in the witticism; just as French, Spanish, and Italian, are, in turn, badly mangled provincial Latin; and Latin is corrupted Indo-European. In the early 12th century, the little written English surviving contained such words as *justice, war, peace, tower, treason, prison, court, crown, empress, chaplain, saint, grace, mercy, charity, faith,* pointing to the Norman roles in military, court, and religious circles. Legal terms especially came from the French; later contributions came from the original Teutonic tribe of Franks, from the French Celts, and from the Latins, all sieved through the growing French corruptions of earlier speech. The Renaissance opened Europe and the English Speech to Latin and Greek words. The earlier Roman conquest of Britain had left such words as *street* (Latin *strata*), *port* (Latin *porta*), Win-*chester,* Wor-*cester,* Don-*caster* (Latin *castra,* camp). A few words in transition are:

Latin	*Old English*	*Modern English*
candela	candel	candle
calcem	cealc	chalk
draco	draca	dragon
oleum	ele	oil
gigantem	gigant	giant
papaver	popig	poppy
salvia	salfige	sage

Many of these words later reentered straight from the Latin; so that we have *chalk* and *calcium; oil* and *oleomargerine; giant, gigantic; sage, salvia,* each pair having the same root. A vast number of words came directly from the Latin; so that the percentage of Latin derivatives appearing in English in certain authors is:

Gibbon	30%
Samuel Johnson	28%
Tennyson	12%
Shakespeare	10%
King James Bible	6%

Greek paid its toll, especially in scientific terms. The Danish conquest (before the Normans came) added a few words, especially place names. The Dutch gave sea-faring terms; Italy, Portugal, Spain, Russia, Hebrew, Persia, Turkey, China, Japan, the American Indians, and much of the rest of the world, contributed their share toward forming the English language we speak.

Yet the native words are still dominant. One-fourth of our actual speech (as of the words actually used in this book, counting every time that each word is used) is shouldered by nine native words:

and
be
have
it
of
the
to
will
you

These 9, with 34 others, all native, form half of the words actually used in English speech:

about
all
as
at
but
can
come
day
dear
for
get
go
hear
her
if
in
me
much
not
on
one
say
she
so
that
these
they
this
though
time
we
with
write
your

Furthermore, in pairs of synonyms, one native, one classical in origin, the greater directness of the native words is striking. Compare *fire, conflagration; bloody, sanguinary; stiff, rigid; fat, corpulent; sweat, perspiration.* Once Samuel Johnson, the great Latinist, said, "It has not wit enough to keep it sweet;" after a moment's reflection, he weakened this with the classical gloss or explanation, "It has not vitality enough to preserve it from putrefaction."

Many modern words are blends of two or more languages. One remarkable word is a hybrid of five languages. The word is *remacadamizing,* which may be analyzed into *re* (Latin), *mac* (Celtic), *adam* (Hebrew), *ize* (Greek), and *ing* (native English). One way that words are formed staggers under the heavy term onomatopoetic, meaning an echo of a sound in nature. The *hiss* of steam, the *clang* of a bell, the *crash* of falling timbers, are examples. Certain words have no known ancestry, as *dog* (appearing before the Norman conquest), *girl, boy, lad, lass, big, bad, pig, cut* (all before Chaucer), and *pun, fun, bore, slang, fudge, rollicking, loaf* (as a verb), and *stunt,* since then. The most prolific source of new words is combination. The Elizabethan age was rich in such compounds as *freshman, huntsman, bookseller, keyhole, rawboned, crestfallen, heartache.* Many of this type of Elizabethan compounds failed to find permanent lodging in the language. Early American settlers added *bull-frog, canvas-back, lightning-bug, garter-snake, ground-hog, pokeweed, copperhead, eggplant, peanut, junebug,* and many more; and recently *pussyfoot, skyscraper, bellhop, hayseed, lounge-lizard, rum-hound,* and countless other *-lizards* and *-hounds* have come in. There are more than 500 words in the dictionary beginning with the classic Greek prefix *anti;* 168 with *auto;* 130 with *tele.* The shortening process gave *van* (from *caravan*), *wig* (*periwig*), *spend* (*dispend*), *rum* (*rumbullion*), *still* (*distillery*); and recently *chum* (*chamber fellow*), *photo* (*photograph*), *cycle* and *bike* (*bicycle*), *gas* (*gasoline*), *pants* (*pantaloons*) and many more.

Folk etymology, or derivation of words by the people, still operates. The World War saw *Mouquet Farm* rechristened *Moo Cow Farm.* The English long before had corrupted the warship *Bellorophon* into the *Bully Ruffian;* the river *Purgatoire* in Texas emerges as the *Picket-Wire.* The language is full of such amusing corruptions. Strange doubtlets are *reindeer* (Norse *hreinn,* deer, and *deer*), literally deer-deer; *greyhound* (*grey* being the name of a dog, not of a color), literally dog-dog. The words for colors corroborate what we have learned in physics of the development of the color sense among men.

> *Black* (akin to Anglo-Saxon *blaec,* shining, whence *bleak*) goes back to Teutonic stems meaning to burn, to scorch. It is kin to Latin *flagrare,* Greek *phlegein,* to burn; *flagrant, flame, phlegm,* anti-*phlogiston,* are from the same root.
>
> *Red* goes back through Teutonic equivalents to Anglo-Saxon *reodan,* to make red, kill; alin to Latin *ruber, rufus, rubidus* (whence *ruby*), red; Sanskrit has *rudhira,* red blood.
>
> *Yellow,* from Anglo-Saxon *geolu,* derives from Latin *helvus,* light yellow; akin to Greek *chloa,* verdure, *chloros,* yellowish-green, tracing back thus to the light green of verdure, as in Sanskrit *hari,* yellow. The words meaning yellow split off from the light green of growing things.
>
> *White* traces back to Sanskrit *cveta,* white, from *cvit,* to be white, or shine.

> *Green* is simple in origin, from Teutonic stems akin to Anglo-Saxon *growan,* to grow. To the same root belong *grow, grass, gorse.*
>
> *Blue* goes through the Teutonic speeches to Middle Latin *blavus, blavius,* blue, livid; perhaps from Latin *flavvus,* yellow. Color names were always variable in their early applications.
>
> *Brown* traces back to Greek *phruros,* brown, from the word meaning a toad. *Gray* is an obscure Teutonic word denoting the color; *purple* from Latin *purpura,* a purple fish, apparently from Greek *phurein,* to mix or mingle.

Thus the colors, in origin, meant scorch; blood; yellow-green verdure; shine; grow; shine; a toad; gray (origin obscure); a purple fish. So do man's abstract names for abstract things grow out of specific verbs and nouns of common meaning; and by their wanderings corroborate the researches of science elsewhere.

Place names persist longest, pointing to the speech of vanished races; practically every English river has a Celtic name, and American rivers with Indian names are numberless. Strange masks are assumed by words, as *Bunker* Hill (from French *Bon coeur*), *Tom Kedgwick* (through French *Petamkediac* from Indian *Quah-Tah-Wah-Am-Quah-Duavic*), *Minetta* Lane (from Dutch *Mintje kill,* little brook), and *Gramercy* Park (from Dutch *De Kromme Zee*). The romance of personal names is as intricate and interesting. A word must be said of modern artificial languages, such as Esperanto, Ro, Volapuk, which have at times attracted a large following. Their object, to make it possible for all men to speak the same language, is worthy; their result has been to add more strange dialects to the world's multiplicity of speech.

A study of the growing vocabulary of a civilized child reveals much concerning the origin of speech; the paucity of early consonant sounds; and other important facts. Oldest of all came the interjections, such as *ah, oh, bah, ugh,* to represent mere emotions. Out of this came, in all probability, the nouns or names of things next, followed closely by the verbs, or names of actions. The other parts of speech developed later. We have learned enough from the science of languages to proceed to the use of language in man's high plateau of literature.

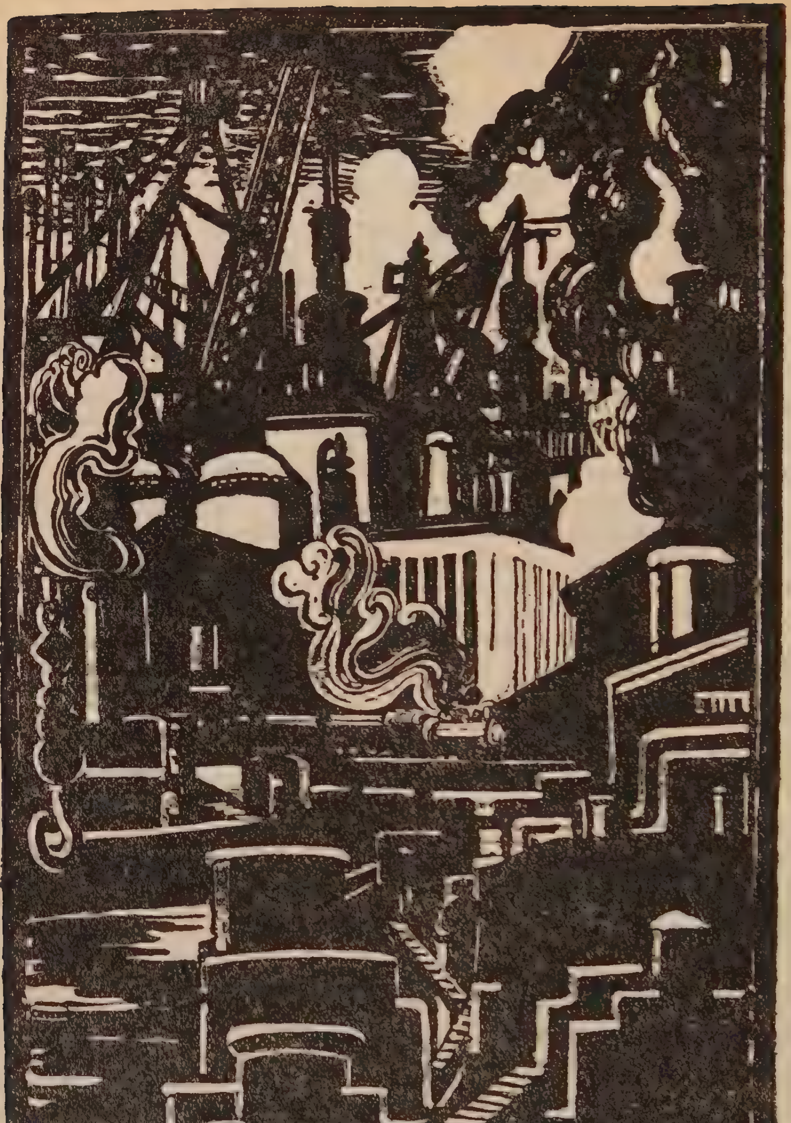
ADDITIONAL READINGS

Sociology. The classic treatments of sociology are *Pure Sociology* and *Applied Sociology, Dynamic Sociology* (2 volumes), and *Psychic Factors in Civilization,* all by Lester F. Ward. Wherever Ward deals with facts within his own knowledge, his thinking is faultless; his only slips are when he accepts generalizations of others. He is one of our clearest scientific brains, and is invariably interesting and stimulating.

Ethics. *The History of European Morals,* by W. E. H. Lecky, is the most readable survey of evolution in morality, emphasizing especially the Christian influence on moral idealism.

Economics. The amplest survey of modern industrial civilization in its inception is *Capital,* by Karl Marx; but its three volumes are somewhat ponderous reading. Many criticisms of Marxism have been published, some of them clear-visioned.

Philology. *The Science of Languages,* by Max Muller, as well as Muller's other writings, are the classic researches of the past century into this science. Any good modern treatise on it will be found interesting by those with a leaning to this subject.



Louis Bromberg

Men to serf their iron spawn,
Steel gulping brain and brawn,
Smoke and clangor like rigid bars:
Are there no trees left? Are there no stars?

BOOK III

THE OUTLINE OF LITERATURE

I. Beginnings: and the East

THE ROMANCE OF THE BOOK

How much, of what you know, did you learn from books, and how much from direct observation or from the words of others? If from the words of others, how much of this information came from books? If your mind were washed clear of all book-derived information, of every kind, would it be a mere desert, or would it have any faint oases of correct information and thinking?

Subtract all the books from the world, and there is little doubt but that man would revert, with something of the speed of a West Indian hurricane, to a condition of savagery, or at least of barbarism. Man's achievements, in the form of knowledge, are preserved in books; without them, civilization is impossible. When man had no books, there was no civilization.

Man has existed, as ape-man or higher, 500,000 years; true man for more than 50,000 years. We have had printed books for less than 500 years. About 1450 A.D. Johann Gutenberg, in Mainz, Germany, made the invention of casting movable type, which made printed lines and pages possible. Paper came into Europe by means of the Arabs; these received it from the Chinese, who invented it. Before paper came, books and private documents were written painstakingly on vellum or parchment, which was leather prepared carefully for the purpose; the college diploma, or "sheepskin," is a vestigial survival of the once general use of parchment. It is deplorably significant that this vestige survives in the field of education, indicating how it is riveted to the ignorance of the past.

Vellum comes from the same stem as *veal; parchment,* from the old town of *Pergamum,* in Asia Minor. Before the gorgeously illustrated parchment books of the Middle Ages, many of them written over scraped-off classic masterpieces which have been recovered in fragmentary form through careful study of these twice-written parchments, man wrote on rolls of papyrus (from which our word *paper* comes). Papyrus was made of the dried fibers of a reedy water plant growing along the Nile, and was invented by the Egyptians, who exported it to the classic nations. The Greeks called papyrus fiber *biblos,* from which came the name of the *Bible* of the Hebrews and Christians.

The writings of the Egyptians were read by means of the Rosetta Stone, discovered in 1799 by a French engineer of Napoleon's army, and translated by the Frenchman Champollion. This contained three parallel rows of inscriptions, in the sacred Egyptian script or hieroglyphic (priestly) writing, in the popular Coptic Egyptian writings, and in Greek. The Greek furnished the key to the others. Similarly, the Babylonian and Assyrian cuneiform or wedge-shaped inscriptions were translated by means of the Behistun Rock, a vast group of inscriptions extolling Darius in Persian, Susian, and Babylonian—a far more difficult writing to translate than the Rosetta Stone. We have found that the Phoenicians invented our alphabet about 1,000 B.C.; these inscriptions largely preceded that achievement of man.

We have already gone behind the age of papyrus, to the age of writing on stone. Assyrians and Babylonians used bricks or cylinders of sun-dried clay; the Egyptians used the stone so common in the Nile valley. The five great continents hold writings on stone, one of man's early steps in book-making and literature. The inventive Saxons developed a method of writing on boards from the beech-tree; our word *book* is akin to *beech.* The early Romans used both boards and the bark of trees; their word for book, *liber,* stood at first for the inner bark; and from this our *library* comes. Behind board, brick, and stone came primitive inscriptions by primitive men on bone, ivory, and animal horns. These still survive—the ancestors of that developed achievement of man's which made possible the preparation of this *Outline of Man's Knowledge,* in writing, printing, and publishing.

LITERATURE IN EGYPT

In the beginning stories were told by word of mouth, largely in the form of poetry; it was a long period before the first story was written down. Such stories still survive, in many cases, in the folktales and myths of primitive and advanced peoples. Each of them had some individual origin, although many minds must have contributed later to the formation of the earliest stories that have come down to us. From psychology, we know that each of these folktales and myths originated as an expressed wish-fulfilment of the individual uttering it. The story-teller or poet was his own hero, no matter how he sought to mask his chief character. The writings of men, rightly interpreted, are the spiritual biographies of men, emphasizing what they wish to do, and, later, what they wish to have remembered of what they have done and have longed to do.

We have a large literature from ancient Egypt, one of the two great roots of our civilization. This consisted of religious books, poems, histories, books of travel, primitive novels, orations, moral treatises, scientific studies, geographies, books of cooking recipes, and even collections of fairy stories—a bewilderingly complex list. There is also the story of the Egyptian Cinderella, glass slipper and all.

A religious hymn composed by a pharoah of the 15th century B.C. indicates the nobility to which the worship of Aten, one of the sun gods, had attained:

> Your face is beautiful in the horizon of heaven,
> O living Aten, creator of life! . . .
> You drench every land with your beauty,
> Your beams inhabit all lands you have made.
> You bind them with your love. . . .
> The birds fly in their accustomed paths—
> Their wings adoring you. . . .
> The birdling in the egg, tapping against the shell,
> You give it breath within its prison. . . .
> How multitudinous are the things you have made!
> You create the land by your will, you alone,
> With peoples, herds, and flocks. . . .
> You give to every man his place,
> You are his life.

The magnificent *Book of the Dead,* the ritual that the human soul must take, memorized word for word, in its onward journeying after death, is suffused alike with poetry, and a keen sense of social justice. The soul must say,

> Hail to you, great god, lord of truth and justice! . . .
> I have not committed iniquity against men!
> I have not oppressed the poor! . . .
> I have not laid upon any free man
> Beyond that which he wrought for himself! . . .
> I have not pulled down the scale of the balance! . . .
> Grant that he may come to you—
> He that has given bread to the hungry,
> And drink to him that was thirsting,
> And that has clothed the naked with garments.

Can all of the "masters, lords, and rulers in all lands" say as much?

Such romances as *The Story of the Two Brothers, The Shipwrecked Sailor, The Story of the Doomed Prince,* and *The Memoirs of Sinuhit,* are absorbing from first word to last. These describe the life of the Egyptians with sharp fidelity; they illustrate the absence of continence on the part of the most admired Egyptian women and men; they are burdened with a strange abundance of supernatural marvels, transformations of men into beasts, animals that talk, magic boats, and constant meetings with sorcerers and deities. War glitters through many of these stories; a peace as thrilled with marvels marks the rest. Murder of one's brother, murder of one's wife and throwing her body to the dogs, murder of one's children to satisfy the whim of a mistress, and feasting with the woman while the scavenger cats and dogs crunch the bones of the young victims within the courtyard below—here we have, in the recovered literature of this race, both the picture of its stodgy official activities, its brutal warfare, and its brilliantly brutal peace-time activities. Marvels spawn on every side, and science is young and weak; physical love and lust run riot, and romantic love is far away. Yet the origin of many fairy stories and romances later appearing in Europe is rooted in the old hieroglyphs of the Nile's children.

BABYLON AND ASSYRIA

The translated literatures of Babylon and Assyria are likewise rich. For law, we have the ancient code of Hammurabi, and many other official pronouncements and codes. There were vast libraries, open to the populace, many of whom learned to read and write. Most of the records of the kings consisted in vainglorious boasts of conquests, killings, and enslavements; but even these are important for the historian, despite their childish exaggerations. Later historians came to mislead with a suaver surface appearance of truth; the Babylonian legends carried back the history of their race to an imaginary period earlier by 700,000 years, giving certain kings a reign of 40,000 years, a life of 50,000 years. The religious myths, of the fall of man, of the great flood, and the salvation of man and beast in an ark, of towers aimed against heaven, clearly influenced the later Hebraic accounts, now available in the Old Testament. But the *Epic of Gilgamesh* and the rest lack the crystallized simplicity of the Biblical narratives.

A fragment of a Chaldean hymn, composed in the city of Ur, before the time of Abraham, includes this noble passage:

> Father, long-suffering and full of forgiveness,
> Whose hand upholds the life of all men, . . .
> First-born, omnipotent, whose heart is vastness,
> And there is no one who may fathom it, . . .
> In heaven, who is supreme? You alone, you are supreme!
> On earth, who is supreme? You alone, you are supreme!
> As for you, your will is published in the heavens,
> And the angels bow their faces.
> As for you, your will is published upon earth,
> And the spirits below kiss the ground.

We may close with brief portion of a prayer of Nebuchadnezzar:

> You have created me. . . . Set the fear of your divine power in my heart. Give me what seems good to you, since you alone maintain my life.

These utterances, of a race bloody enough, judged by our standards, show red-handed and red-hearted early man groping upward, seeking without for that temperance which only what is within may order and enforce.

THE WRITINGS OF THE HEBREWS

As literature, the Old Testament, especially when clothed in the majestic native English of the King James version, holds high rank among the greatest achievements of men. The historical books, judged as literature, contain nuggets of drossless gold. The majestic opening poem of the creation, the hideous story of Lot and the mob, the brisk romance of Joseph and his brethren, the shaped narrative of Moses before Pharaoh, the amazing code of conduct and worship, the glorious ancient song of Deborah, the swaggering exploits of Samson and his high end, would gem any literature. David's conquest of the giant Goliath, and his later faltering before the giant Ishbi-benob, are splendid tales of derring-do; while the lovely idyll of the stained love of David for Bathsheba, his murder of her husband Uriah the Hittite, and the resultant death of his first child by Bathsheba, make one of the most appealing romances in the ancient chronicles. There is of course much dull matter interspersed between these gems, but even the baldest chronicles are clothed in an English translation that is a model of word economy and word beauty.

The books of Ruth and Esther, one an idyll placed in the pastoral fields of Judah, and the other a heroic episode of court life in Persian Susa, furnish two splendid pictures of womanhood. Hebrew literature is rich in its women; but these two episodes crown all. There is romantic love in Ruth, as when she says to Naomi,

> Entreat me not to leave thee,
> Or to return from following after thee;
> For whither thou goest, I will go;
> And where thou lodgest, I will lodge;
> Thy people shall be my people, and thy God my God.
> Where thou diest, I will die,
> And there will I be buried.
> The Lord do so to me, and more also,
> If aught but death part thee and me.

But this is the romantic love of a woman for another woman, and not for a man; there is no element of romantic love in the conquest of Boaz by Ruth, with Naomi's counsel.

When we reach the book of Job, we have one of the high spots of all literature. Belief in a devil, or Satan, absent in Genesis, has now grown to a belief that one of the sons of God, named Satan, is a frequenter of God's court. When the Lord boasts to Satan of the fidelity of his servant Job, Satan retorts that only prosperity makes Job devout. The Lord offers to let Satan test this, by taking from Job all that he has; with this permission, Satan strips Job of wealth and family, and plagues him with hideous boils. In glorious poetry, Job curses the day of his birth, and will not be comforted by his friends. It is no gentle picture that Job draws of human injustice:

> Some remove the landmarks; they violently take away flocks, and feed thereof.
> They drive away the ass of the fatherless, they take the widow's ox for pledge.
> They turn the needy out of the way; the poor of the earth hide themselves together. . . .
> Men groan from out of the city, and the soul of the wounded crieth out.

The poem rises to the tremendous height in which God challenges Job out of a whirlwind:

> Gird up now thy loins like a man; for I will demand of thee, and answer thou me.
> Where wast thou, when I laid the foundations of the earth? declare, if thou hast understanding. . . .
> Who laid the corner-stone thereof,
> When the morning stars sang together, and all the sons of God shouted for joy? . . .
> Out of whose womb came the ice? and the hoary frost of heaven, who hath gendered it? . . .
> Canst thou bind the sweet influence of Pleiades, or loose the bands of Orion?
> Canst thou bring forth Mazzaroth in his season? or canst thou guide Arcturus with his sons?

Mazzaroth stands for the twelve signs of the zodiac. In the end, Job humbles himself, and receives a double supply of riches, and a hundred and forty years more of life. This is one of the noblest dramatic poems that man has written.

The book of Psalms contains many brief lyrics and odes as impressive in small as Job in the large. Many of these have passed into the folk-memory of the English race. Proverbs, which follows, consists of shrewdly sophisticated epigrams; and the most amazing inclusion in the Old Testament is the Song of Songs, attributed to Solomon, a collection of folk nuptial songs, breathing the passionate animal love of the Orient, garmented in rich symbolism. This book proved bewildering to the stolid Protestants; when they included it in their Bibles, they interspersed the passionate love poetry with their own sober explanations, given in italics below:

The church's love to Christ.
Let him kiss me with the kisses of his mouth;
For thy love is better than wine. . . .

Mutual love of Christ and His church.
Stay me with flagons, comfort me with apples;
For I am sick of love.
His left hand is under my head, and his right hand doth embrace me. . . .

Christ's coming is prayed for.
Make haste, my beloved,
And be thou like to a young roe
Or to a young hart upon the mountains of spices.

The twelfth chapter of Ecclesiastes ranks with the peaks of Job and certain of the Psalms as the most magnificent poetry in the whole book. The tremendous vituperations of the great insurgent prophets hold insistent demands upon the wealthy oppressors of the poor among the Hebrews,

Let justice roll down like waters,
And righteousness as a mighty stream. . . .

rising from this cry of Amos to the exalted vision of Isaiah,

Behold my servant, whom I sustain,
My chosen, in whom my soul delighteth. . . .
A cracked reed he shall not break,
And the dimly-burning wick he shall not extinguish.

He shall faithfully bring forth justice.
He shall not fail or be discouraged
Till he have set justice in the earth;
And the isles shall wait for his law.

This *justice* is the loose translation of the Hebrew term *mishpat;* its exact meaning we shall grasp more fully, when we reach Book V: *The Outline of Religion.*

So the orthodox cannon of the Old Testament rolls to its majestic close, with the apocalyptic visions of Ezekiel and Daniel, those strange half-mad visions of the being of God himself. It is a pity that the interesting historical books of the Maccabees, still included in Roman Catholic Bibles, are omitted from the Protestant narratives; they earn inclusion. The whole orthodox canon is a jumbled anthology of the history, myths, laws, songs, idylls, and orations of a great race; and its crystallization in the exquisite Elizabethan English of the King James version furnished the strongest single literary influence upon the development of literary English.

The New Testament is also a Hebrew product, in spite of its original language, Greek. Barring a few of the utterances of Jesus, and the marvelous thirteenth chapter of 1st Corinthians, it falls far below the Old Testament in poetic beauty. Yet the dignity of narrative diction is still here; and, for sheer amazing imagery, the concluding Book of Revelations soars above Ezekiel and Daniel. The Talmud is the great Hebrew Rabbinical interpretation of the Old Testament, and, with that anthology, constitutes the sacred books of Judaism. The oral laws and traditions in parts of the Talmud at times date back to the period of Moses; and orthodox Jews have bestowed infinite devoted scholarship upon the complex treatise. In the English translation, it forms some twenty volumes, and is essential to any student of comparative religion.

After the Talmud the production of Hebrew literature, chiefly on theologic subjects, continued unabated. The critical Masorah, the slowly-growing Liturgy, the wide writings after the 10th century A.D. on law, theology, science, and poetry, form an impressive body of literature. The center of Jewish culture moved to Spain. The greatest of all Jewish medieval scholars was Moses ben Maimon, called Maimonides by Christians; his activities, and those of his followers and opponents, awoke the Jewish spirit of scholarship throughout Europe. Moses Mendelsshon, in the 18th century, sought to swing Judaism into close relation with external learning. Literature in Hebrew, and also in dialects such as the Yiddish, is still being produced; but, until the Jews inhabit a land in which one of these is the dominant speech, the writings remain out of the midstream of man's social and literary progress. The Jewish contribution to literature extends far beyond the writers in Hebrew and the dialects, for almost every living literature has been enriched by distinguished men of Hebrew blood, using the language of their adopted country.

THE SONGS OF PERSIA

So far, we have accepted literature as an entity, and not sought to distinguish between its two largest divisions, poetry and prose. Literature, in the more exclusive sense, is the expression of thoughts which appeal to the high and noble emotions, and their opposites. Its two divisions are poetry and prose; and what distinguishes these is the method of the expression. Poetry is literature adapted by some device to a musical pattern; prose is literature not adapted to a musical pattern. The poetic devices vary widely among different races. In English, the device consists, stripped down to its essentials, of words whose rhythm tends toward uniformity, rather than toward variety. Thus rhyme in English is a non-essential; and the poetic rhythm may vary from a lock-step succession of similar poetic feet, adapted to a simple song or hymn tune, to a tremendous free verse symphony, adapted to music of more complicated rhythms. Other lands have developed other devices; among the Hebrews, it was parallelism, or the repetition of the same thought in words slightly differing,

> Lift up your heads, O ye gates; and be ye lifted up, O ye everlasting doors.

We found this also in Babylonian writing; and the impressive Hebrew doublets and triads form a definite musical device. Among the Anglo-Saxons, the device was alliteration, or the repetition of the same vowel or consonant in a line, the custom of this land requiring three uses of the same sound to each verse or line of poetry:

> In a summer season, when soft was the sun,
> In rough cloth I robed me, as I a rude shepherd were,
> In habit like a hermit in his works unholy,
> And through the wide world I went, wonders to hear. . . .
> All the world's weal, all the world's woe,
> Truth and trickery, treason and guile,
> All I saw, sleeping.

So opens Langland's *Piers Plowman,* a later Anglo-Saxon product. Among the Japanese, the device consisted in a definite number of syllables to a poem; among the Greeks and Romans, of definite rhythm based upon quantity or duration of the syllables.

These devices came in, as an adaptation to music. There are many theories of the origin of poetry, but the most probable traces it from a composite art, consisting of some primitive tribal dance, with primitive tribal music, and the word-pattern spontaneously springing up, under a state of high social emotional tension. This would first consist of some word or phrase, repeated at intervals; and this would become, in the end, the choral response, or refrain. An individual leader of the poem-song-dance would improvise lines; the response would break the story, and give opportunity for further improvisation. If this theory is correct, it would point to popular folk ballads, with refrains, as the earliest form of poetry; and the literatures of all lands yield such ballads at the beginning, either preserved in fact or in legend. The Song of Deborah in the Old Testament, the vast array of English and continental folk ballads, illustrate this early step. Soon enough the poetic device would serve a secondary function—a mnemonic or memory device, permitting the subject matter of the poem (some tribal fragment of history or myth), to be remembered more easily. At this stage, even tribal history, in the form of tables of kings, would be cast in the poetic form, to aid in recollecting it; as in our childhood rhyme of the kings of England, commencing,

First William the Norman, then William his son,
Henry, Stephen, and Henry, then Richard and John.
Next Henry the Third, Edwards One, Two, and Three,
And again, after Richard, three Henrys we see.

Out of the ballad stage grew the epic, the noblest narrative form of poetry. An epic properly is a narrative poem of great length, concerned with the activities of some national hero, and usually with a supernatural machinery aiding or retarding the human actions.

The Gilgamesh epic fragment from Babylon, and certain Hebrew fragments, point toward an epic in construction; from their early days, the Persians possessed the materials for an epic, in their myth of the battle of a sun-god against a fearful serpent; of the first man, Yama, ruler of the golden age of the earth, and, after his death, of the realm of the departed; and other great tales. Before these myths were cohered into a national epic, Persia had acquired a prophet and a Bible. Zoroaster, a misty figure flourishing about 1000 B.C., embodied in the great five-fold Zend-Avesta his high and dignified religion, in which he saw the universe as the battleground of two vast forces, Good and Evil, or Light and Darkness; with fire as the symbol of the Good, or the Light. Two thousand years later, or just before 1000 A.D., the Persian poet Firdousi wrote the national epic of his land, with great skill weaving the old legends into the newer religion of Islam.

The Sassanid era in Persia, which was marked by the exile of the Greek influence that had dominated since Alexander, developed an extensive literature, upon both religious and lay themes. Soon after the death of Haroun-al-Raschid, the caliph of the Arabian Nights, or during the 9th and 10th centuries of our era, the Persian language assumed the form which it has largely held for the last thousand years. It was difficult at first for the new language to replace Arabic; but it persisted. Odes, epigrammatic quatrains or four-lined poems, and modern epics appeared in steady profusion. Prose appeared first in the translations of Arabic writings; and the classic period of Persian literature reached its height in the epic of Firdousi, already referred to, which some critics class beside Homer's great songs. Firdousi's epic, the *Shahnama,* released a flood of lesser epics, dealing with various ancestors and descendants of the Persian hero Rustum (whom Matthew Arnold used as a central figure in his frigid *Sohrab and Rustum,* 800 years later). Alexander the Great, Mahomet, Moses, Timurlane, were a few among the borrowed heroes celebrated in poems of appalling length.

This is a world of literature which has hardly penetrated the West; but, thanks to the creative genius of one translator, Edward Fitzgerald, who opened up the disillusioned quatrains or *rubaiyat* of Omar Khayyam, Persian literature has spoken its direct word to us. Omar, tent-maker in his youth, astronomer and poet in his maturity, still speaks in our ears through the magic of Fitzgerald's rendering:

I sometimes think that never blows so red
The Rose, as where some buried Caesar bled;
  That every Hyacinth the Garden wears
Dropt in her Lap from some once lovely Head.

And this reviving Herb, whose tender Green
Fledges the River-Lip on which we lean—
  Ah, lean upon it lightly! for who knows
From what once lovely Lip it springs unseen! . . .

Heaven's but the Vision of fulfilled Desire,
And Hell the Shadow from a Soul on fire,
  Cast on the Darkness into which Ourselves,
So late emerged from, shall so soon expire. . . .

The Moving Finger writes; and, having writ,
Moves on: nor all your Piety nor Wit
  Shall lure it back to cancel half a Line,
Nor all your Tears wash out a Word of it. . . .

Ah, Love! could you and I with Him conspire
To grasp this sorry Scheme-of-Things entire,
  Would we not shatter it to bits—and then
Remould it nearer to the Heart's Desire!

Greatest among the lyric poets were Saadi and Hafiz; Jami, the last of the classic poets, influenced the literature nearly as profoundly. The East, including Persia, is hardly emerging today from its long fallow period. Yet, in the words of the American poet Robert L. Wolfe,

Just when you covet comfort most, the East
Showers again these stars like gusts of snow.

There is a pallor in the sky; our ears are pricked for the cockcrow.

ARABIA AND INDIA

Arabian literature began long before the coming of Muhammad; it was expressed in folk-verse patterned, for purposes of easier recollection, with end-rhyme and metre, and a constant use of the end-stopped line, or line whose meaning stops at its end. Thus these lines from Pope are end-stopped:

A little learning is a dangerous thing;
Drink deep, or taste not the Pierian spring;

while the higher flight from Shakespeare's *The Winter's Tale,*

Daffodils
That come before the swallow dares, and take
The winds of March with beauty; violets dim,
But sweeter than the lids of Juno's eyes
Or Cytherea's breath . . . bold oxlips and
The crown imperial,

lets the meaning run on from line to line. The Arabic poets preferred the former device; and it is our loss that the multitudinous soul-flowerings of these poets have not become available in creative translation. When the Moslem world moved its heart to Spain, the custom of poetry persisted, such kingly singers as Mutamid of Seville soaring in the tradition of song, and choosing a premier and a wife for their excellence in poetry.

Arabia also gave the world impressive histories, biographies, and scientific work; and it gave to the eager ears of mankind that magnificent collection of folk-tales called *The Thousand and One Nights,* or *The Arabian Nights' Entertainment.* The stories of Sindbad the Sailor, of Aladdin and his wonderful wishing lamp, of Ali Baba and the Forty Thieves, are part of the heritage of our childhood. The good Caliph of Bagdad, Haroun-al-Raschid, is an enduring portrait of the lovable benevolent despot; and such memories as of the djinn clouding against the sun out of the unstopped bottle, the King of the Black Isles half-stilled into marble, and the roc-stirred valley of diamonds, are among the great imaginative flights of the race.

India began with the rich folksong epic, the Rig-Veda, perhaps dating back to 1400 B.C. The songs begin with the nomad Aryan tribes hovering on the hilly borders of India, and deal with their scattering and settling southward. Three other Vedas followed, all being primarily collections of sacred texts, chiefly poetical. There are also the sacred Upanishads, many of these rising to noble heights of primitive religious feeling, and forming a basis of later religious development.

The classic period of Indian literature appealed only to the small educated class. Its national epics are the Mahabharata and the Ramayana, the former eight times as long as the combined length of the two Homeric poems, the latter as long as Iliad and Odyssey combined. The first of these dates earlier than 300 B.C. Compared to the European epics, these are marked by grotesque fancies and wild exaggerations, typical of the Oriental mind in its environment of horrid and menacing Nature; yet they reach high and poignant flights of poetry. Many artificial epics and lyric poems appeared later; but these have as yet made small imprint upon the Occidental mind. The Sakuntala, the masterpiece of India's chief dramatic poet, has recently been made available in an adequate translation.

So far, these products have been in the dead language, Sanskrit; since 1100 A.D., the dominant writings have been in Hindostani. Like the later Sanskrit productions, these have not greatly affected the Western mind, with the exception of the writings of Rabindranath Tagore, a living poet-philosopher of great importance in his own land, yet with a message that sounds inane and artificial to our ears.

CHINA AND JAPAN

The literature of China is remarkable for its high antiquity, continuing with hardly a break down to the present; and for its exhaustive treatment of each small detail of Nature dealt with. Some of the national songs and ballads reach back to 1800 B.C. Confucius, in the 5th century B.C., edited more than 300 of these songs. They invariably contain rhyme, and a definite line-form. Recently a number of volumes of adequate translations of many of the more distinguished Chinese poems has appeared, and the Celestial Kingdom's treasury of song is now available to us.

During the reign of Ming Huang (712–756 A.D.), the "Brilliant Emperor" of the resplendent T'ang dynasty, China's three greatest poets flourished. Foremost among these was Li T'ai-po, popularly called the "Banished Angel," so heavenly were his inspired improvisations, always written under the influence of wine. He is said to have met his death, after a tipsy frolic, by leaning out of a boat to embrace the face of the mirrored moon. Tu Fu is ranked beside Li Po, the two being called the chief poets of the land. Tu Fu led a broken life, dying of excesses after breaking a fast. Po Chu-i was almost as distinguished, both in diplomacy and poetry; and his poems were collected by imperial edict and engraved upon tablets of stone. The number of later poets, dramatists, historians, and writers upon general themes is almost countless; but it is the works of these three that have chiefly reached us. In the writings of Li Po we get fragments as lovely as:

> The riderless horses scream in fright, lifting their heads against
> the sky. . . .
>
> The gibbons moan and grieve along the Serpent River. . . .
>
> Her eyebrows, delicate as the antennae of a moth;

or this exquisite *Song of the Autumn River:*

> In the green clear water
> The moon shimmering.
> In the moon glimmer
> White herons flying, flying.
> A young man hears a sound—
> The sound of a girl plucking water-chestnuts.
> They paddle home together,
> And the night also is singing.

There is also this typical poem, by the emperor Wu of the Han dynasty:

> The silken sleeves have ceased their rustling,
> Dust settles in the Courtyard of Jade.
> The empty houses are still and cold.

On the bars of every doorway
Dead leaves lie quietly.
I ache for the Most Lovely One:
How can I feed my desire?
Pain shatters my heart:
There is no peace.

Japan received its classic literature from China, much as Europe derived from Greece and Rome, and America from England. But Japanese lyric poetry was native. Some early maker of Japanese songs discovered the charm produced by lines containing 5 and 7 syllables, used alternately. In the form called the *tanka,* there are 31 syllables, the lines containing, respectively, 5, 7, 5, 7, and 7 syllables. This form is simple: there is no requirement, except the actual number of syllables be as given above; with the added necessity that the result affects the reader emotionally, as in the case of all poetry. The even slimmer *hokku* consists of merely 17 syllables, arranged 5, 7, and 5. There is no rhyme, no metric variety, no permitted deviation from the strict numbering of syllables. A typical hokku is:

More fleeting than the
Flash of withered windblown leaf,
This thing men call life.

Count the syllables, to make sure that it follows the hokku pattern. No simpler exercise in versification can be given, than to write a tanka and a hokku. This gives verse; if the verse also stirs the emotions profoundly, the result is poetry.

The two masters of Japanese poetry were Hitomaro and Akahito, both of the early 8th century A.D. Next to them stands Tsurayuki, two centuries later. Japanese classic poetry ended in the 13th century A.D. The ensuing Dark Ages of Japanese literature gave birth to the Japanese drama, called the *No.* These stately dramas alternate in popular favor with extravagant farces; but neither of these has yet penetrated with much success the West, its ears deafened by the uproar of a materialistic civilization.

ON TRANSLATING POETRY

In dealing with the poetry of foreign nations, it is well to remember that there is no such thing as the translation of a poem. Poetry, at its height, calls for a technical utilization of the poetic devices of the particular land. It has, moreover, a magical word-music; since the poet selects, to convey his emotion, words whose tug at the heart-strings can be felt, but not measured nor rendered in any equivalent form. Take these two magical lines from Keats:

Magic casements, opening on the foam
Of perilous seas, in faery lands forlorn.

Accurately translated, this would give,

Supernatural windows, unclosing on the bubbles
Of dangerous oceans, in dejected enchanted countries.

All the poetry is gone. All translation is as difficult. There is present, thirdly, an evocative element. Thus when Alfred Noyes uses, as the climax line in his brief jerrybuilt chant, *Marchaunt Adventurers,*

England! England! England! England!

this mounts, to those who feel with him the long peaks of glory of England's past (forgetting for the moment the valleys, deep as the peaks are high, of disgrace and obloquy), to a magnificent emotional climax. A translation of this, where the mere name of a foreign land is repeated four times, by a poet, and to hearers, who can not throb to the remembered triumphs, is meaningless and drably prosy. Words used rightly in poetry evoke, in attuned ears, music entirely unspoken; and the most gifted translator can not repeat this evocation, using an alien tongue.

The only translation of poetry is not translation, but re-creation. When Fitzgerald made the quatrains of Omar Khayyam a possession of the English race, he did this by subduing his mettle entirely within the attitudes and music of his original, and then bringing up from his own subconscious deeps a new poem, saying much the same thing, but saying it in an English way to English hearts. He was a creator, not a translator. In the translations given, the attempt has been made to recreate the mood and the appeal of the original, rather than to give the literal words, altered into the different coin of a foreign speech. The attempt inevitably fails to give the full flavor; but something of the magic may survive, to those whose imaginative natures can reach out and feel through alien bodies, can gaze through alien eyes,

> Those few windows in the tower
> That is the head of a man.

Beyond this, the historian of literature can not go. These, in their original form, set the hearts of different men trembling; soon enough we will reach singers who lift their songs into our own hearts' core of cores.

ADDITIONAL READINGS

EGYPT. *Popular Stories of Ancient Egypt,* by Sir G. Maspero (New York, 1915), is a splendid volume of translations of miscellaneous early Egyptian fragments from pyramid and papyrus.

THE HEBREWS. *The Bible* and *The Talmud,* the former in the King James Version, are unsurpassed for a first-hand picture of ancient times.

PERSIA. Any edition of Fitzgerald's translation of the *Rubai'yat* of Omar Khayyam is excellent; the Fourth Edition is the finest poetically.

ARABIA. The classic translation of *The Arabian Nights' Entertainment* is Burton's; although any good translation is sufficient. *The Poems of Mutamid, King of Seville* (in *The Wisdom of the East* Series) gives an excellent idea of Moslem poetry.

CHINA. The translations of Chinese poems by Arthur Waley have something of the authentic magic of the originals; those by Witter Bynner are also noteworthy.

INDIA. Adequate, though uninspired, translations of the *Mahabharata,* the *Ramayana,* and other sacred East Indian writings are obtainable in Everyman's Library, and other cheap editions.

ORIENTAL POETRY. *Coloured Stars,* Fifty Asiatic Love Poems translated by Edward Powys Mathers (Boston, 1919), is an exquisite collection, of love poems recreated into English. *A Feast of Lanterns* (New York, 1916), translated from the Chinese by L. Crammer-Byng, is an uninspired rendition of Chinese lyrics.

II. Greece and Its Pupil, Rome

THE BLIND SINGER

Out of the mists of the buried youth of man two literary products stand preeminent, in the eyes of the Western world: the Bible, and the two epics attributed to Homer. Other vast shadows loom up, such as the Indian epics, the Egyptian writings; but these remain forever outside of us, while the Testaments, and the *Iliad* and *Odyssey,* have been transplanted to grow afresh within our very hearts.

Whether such a man as Moses, to whom authorship of certain books of the Old Testament is attributed, ever lived or not, and whether he ever composed one line of the writings, are still matters of profound professorial dispute. There is as much disagreement over the dim figure of Homer, pictured for us as a blind singer wandering from city to city in the Greece of 1000 B.C., chanting his great epics, and dying homeless, with seven cities after his death claiming to be his birthplace. Whether such a man ever lived or sung, or whether the two epics are the work of some anonymous poet, or two, or many, we have the poems: and it is most convenient to refer to them as the Homeric epics.

As we have seen, the historical basis for the poems is an actual siege or series of wars between the Greeks and the Hittite settlement of Troy; but the poems wander far from historical accuracy. The *Iliad* (named from *Ilium,* the Greek name of Troy) is placed near the end of a long siege of Troy by the Greeks, and retells the beginning of the conflict, and the nine years of intervening warfare. According to the legendary story of the war, as found in the poem, all of the trouble originated in feminine vanity. This occurred in a dispute between Juno or Hera, queen of heaven; Venus or Aphrodite, goddess of love and beauty; and Pallas Athena or Minerva, goddess of wisdom, as to which was entitled to a golden apple, tossed into the land of the gods by the goddess of discord, and inscribed "For the fairest." The three vexed beauties agreed that Paris, the young son of Priam, king of Troy, should decide; and each goddess offered the youth an appropriate bribe. Carefully considering these, Paris awarded the prize to Aphrodite, in return for her promise to give him, as reward for his partiality, the most beautiful woman in the world.

The moral attitude throughout, so different from our own expressed moral standards, is interesting: bribery of judges, and divine promotion of adultery, occurring at the beginning of the story. For Helen of Sparta, whom Aphrodite designated as the prize Paris was to have, was married at the time to King Menelaus of Sparta. So great had been the fame of her beauty, during her wooing by all the Greek princes, that they had sworn an oath to abide by her choice of a husband, and jointly to avenge any subsequent harm to her: this in order to prevent turmoil in Greece, caused by unsuccessful suitors for her hand. So Paris, his way smoothed by the goddess of love, visited Sparta, and without difficulty persuaded the young wife to elope with him. The Greek princes, led by Agamemnon of Mycenae, the brother of Menelaus, pursued the lovers to Troy, and laid siege to it. Wisest of all of them was old Nestor; shrewdest of all was Odysseus or Ulysses; most valiant of all was Achilles. Aphrodite and Ares, or Mars, sided with the Trojans; Hera, Athena, and Poseidon, or Neptune, the sea-god, were for the Greeks; while Zeus, or Jupiter, remained neutral.

The plot of the poem centers about the wrath of Achilles. Agamemnon, forced by a god to restore the daughter of a priest whom he had appropriated, tyrannically announced that as his share he would take from Achilles the fair Briseis, the latter hero's share of the conquered women. Achilles retired to his tent in anger; and this wrath, and its results, fills the rest of the poem. With Achilles away, the battle goes against the Greeks. A duel between brave Hector, leader of the Trojans, and the Greek Ajax, ends indecisively. Achilles, offered Briseis again, as well as one of Agamemnon's daughters in marriage, refuses indignantly any compromise based in part upon shopworn goods. With brilliant audacity two Greek chieftains enter the Trojan camp in the night, and steal the snow-white steeds of Rhesus. The baffled Greeks, after more reverses, clothe Patroclus, best friend of Achilles, in the armor of the latter; and in battle Hector kills the sham Achilles.

The real Achilles rages now, not against his own leader, but against the slayer of his friend, and the capturer of the famous armor of Achilles. Clothed in new armor forged by Vulcan, the smith of the gods, Achilles strides forth, meets Hector, and the frightened Trojan flees three times around the walls of the doomed city, while the gods debate as to what fates they shall deal out to the energetically sprinting heroes. The pleaders for Achilles win, and in a battle marked by divine treachery Hector is overcome and slain. Achilles foully misuses his chivalrous opponent's body, but in the end repents, and permits a noble funeral for the noble Trojan. With this, the poem ends; but it is interesting that this violation of observances due to the dead thereafter prevented Achilles from becoming a national hero of the Greeks. Helen duly returned to Sparta with her husband Menelaus, to plod with him through weary, unromantic years of old age and fading charms.

The *Odyssey* deals with the wanderings of Odysseus, or Ulysses, after the fall of Troy. His followers are killed through their sin in slaying and eating the oxen of the sun-god. Odysseus by craft kills the giant Polyphemus, a vast one-eyed son of Poseidon; and the hero is detained on her island by amorous Calypso, a nymph who wished to marry him. She releases him at last, and a shipwreck throws him among the Phaeacians, whose princess, Nausicaa, is attracted to the wanderer. In the celebrations in Phaeacia, Odysseus tells the story of the Wooden Horse, in which the Greek chiefs concealed themselves, and of the fall of Troy; of his visit to the enchantress Circe, who turned men to swine; and of his descent into Hades, the Greek hell. After many strange adventures, Odysseus returns home, where his faithful wife Penelope is being plagued with suitors. Odysseus slays these, and the poem ends happily in a domestic reconciliation.

Both epics are written in hexameters, or long, poetic lines with six poetic feet to each line. A typical hexameter is Longfellow's

> This is the/forest pri-/meval, the/murmuring/pines and the/hemlocks

where the feet are separated by the sign (/). A pentameter, or 5-foot line, would be this from Shakespeare's *Hamlet:*

> To be/or not/to be/that is/the question.

A tetrameter, or 4-foot line, would be this conclusion of Coleridge's *Kubla Khan:*

> And drunk/the milk/of Par-/adise

The use of a line as long as the Greek hexameter indicates, according to modern scholars, that the normal breath-length of the Greek singer was greater than that of the English poets, whose standard is the shorter 5-foot line; it indicates from this that the singers of the Greek epics were warrior-singers, rather than mere peaceful poets.

Among famous translations of the Homeric poems are those by Chapman, a contemporary of Shakespeare, which later inspired a splendid sonnet tribute by Keats; a glittering rendering by the English poet Alexander Pope, far too witty and polished to reflect truly the Greek spirit; and a number of other prose and verse translations. No one of these fully satisfies; and, for the story, which is well plotted and highly readable, any good prose translation is to be preferred to the limping English verse.

The *Iliad* is the more warlike and bloody of the poems; the *Odyssey,* with its gentler domestic mood, seems to be the product of a later age, or at least of a later period in the life of the author. The name of Homer is also coupled with a number of minor poems, the Homeric hymns, apparently short introductions to lost epic recitals. These share something of the sublimity of the two major epics. Ancient Greeks rank near Homer an early poet almost as misty, Hesiod, author of *Works and Days,* dealing with farm and sea life, and the *Descent of the Gods,* dealing exhaustively with primitive mythology. Both of these have lost their charm for man today.

GREEK LYRIC POETRY

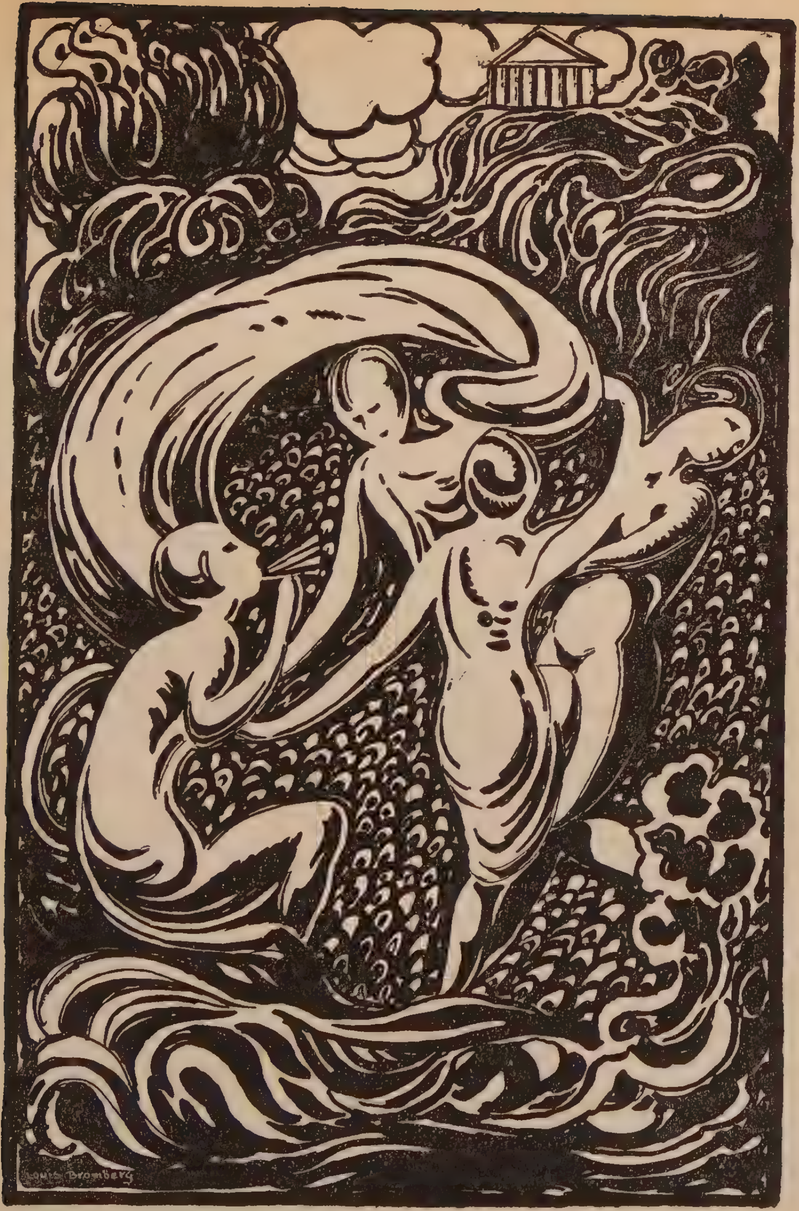
In epic and indeed all narrative poetry, the poet tells the story as if he had been present and seen the happenings. In drama, he lets the characters speak for themselves. In lyric poetry (poetry written originally to be sung to the lyre, a musical instrument), the poet himself speaks subjectively, voicing his own longings. To the Greeks, there were two supreme poets: Homer, "the" poet, and Sappho, "the poetess." Her work, and that of most of the Greek lyricists, unfortunately for us, is known today only in fragments.

She lived in the great 6th century B.C. on the island of Lesbos, where she was the acknowledged head of a school of poets. Among the stories that have grown up about her is that, because she was repulsed by Phaon, whom she desired as a lover, she leaped into the sea; although the story is not clear as to whether she was killed or not. Her poetry is filled more with love for women than with love for men; and the phrase "Lesbian love," signifying the physical love of women for each other, comes from her singing and her practice.

Her favorite stanza form is named Sapphic, after her. One stanza by Swinburne illustrates its form and quality:

> All the night sleep came not upon my eyelids,
> Shed not dew, nor shook nor unclothed a feather,
> Yet with lips shut close and with eyes of iron
> Stood and beheld me.

The diagram of this stanza, scanned according to quantity or duration of the syllables, would be scanned as follows. The sign (—) indicates a long syllable, the sign (˘) a short one, while (⏓) means that either a long or short may be used. English verse does not have the division into long and short that classic Greek and Roman verse used; instead we have accented syllables, indicates by (′) or (–) and unaccented syllables, shown by (˘). In writing Sapphics in English, it is best to use an accented syllable where the Greek used a long


Louis Bromberg

Song to kiss grim stones awake,
Dance till quickened brains quake,
And the heart's deepest will
Whitely crowning the dusty hill.

syllable, and an unaccented where it used a short. In any case, this rhythm sounds a trifle artificial in English. The scansion of the stanza then would be:

— ⏑   — ⏓   — ⏑ ⏑   — ⏑   — ⏓
— ⏑   — ⏓   — ⏑ ⏑   — ⏑   — ⏓
— ⏑   — ⏓   — ⏑ ⏑   — ⏑   — ⏓
— ⏑⏑   — ⏑

Sappho has been preserved to us only in fragments; but the old acclaim to her name still shrines her high among the world's poets, and the world's women. Greece had many other lyric poets; but they are hardly more than names to us now. Sappho's lover, Alcaeus, a poet from Lesbos, who described her as "Pure Sappho, violet tressed, softly smiling," favored a complicated stanza, named after him the Alcaic. Simonides wrote odes (longer lyric poems, of formal stanza arrangement) to arouse Greek patriotism; Tyrtaeus, an Attic or Athenian war poet, wrote chiefly for the Spartans, and became one of their generals. A poet made a general! This idea surprises today, when many regard poets as long-haired, trousered or skirted feeble-wits, who prattle to robins and daisies, and breakfast on two grains of rice and a fifth of a prune. We should have been amazed if Wilson had promptly named Edwin Markham and Maxwell Bodenheim generals beside Pershing, in the World War; in the ancient days, poets, in the absence of distinguished prose writers, scientists, and military specialists, stood high in general esteem.

Solon, the Athenian lawmaker, and Theognis, a short-visioned aristocrat, who hated the poor, wrote verses of the dogmatic or preachy sort. Anacreon was the high laureate of wine and love, writing in a lighter and less passionate vein than the fiery pen of Sappho. Corinnna was a woman poet of Boeotia, second only to Sappho; Bacchylides and the Theban Pindar, who wrote about 500 B.C., or a century after Sappho, were greatest among choral lyric poets. Merely names, surviving like lifeless sea-gnawed shells cast up on the ebb-shore of time; like fossil skeletons of life, that once rioted gloriously in a world that is today less than fossil skeletons.

From time to time fragments of these stilled singers are discovered for the eyes of the modern world. In 1896 an ode by Bacchylides was found on Egyptian papyrus, frayed and incomplete. This celebrated the triumph of a horse owned by Hiero, tyrant of Syracuse, at one of the Olympic games; and contained also mythic material not found elsewhere. Several of the odes of Pindar, extolling victories at the great pan-Hellenic contests known as the Olympic, Isthmian, Pythian, and Nemean games, are known in full; which has caused the European world to refer to the formal Greek ode as the Pindaric ode, although in ancient times Pindar was only one among several high practitioners in this form of art. Exquisite as was his form, his content was even more lofty and lovely:

> I am no sculptor,
> To shape images that dull idly, on one pedestal, forever:
> No, sweet song of mine,
> Go forth from sea-washed Aegina,
> On every freighted ship, on every dancing bark.

Almost three centuries later, Grecian Sicily produced Theocritus, the leading pastoral poet of the ancient world. A pastoral is a poem celebrating primarily the joys of country life; the pastorals of Theocritus grew naturally from his observation of actual shepherds tending their flocks, and piping and singing, on the green slopes under the blue arch over Sicily. After him came Bion and Moschus, two lesser poets, whose pastoral idylls are saddened by a chant for the dead. The poet Meleager, in the 1st century B.C., began the collection of the famous Greek Anthology, which in its final form included brief songs from poets as far apart as 600 B.C. and 500 A.D.

GRECIAN DRAMA

Greece early developed a dramaturgy, or stagecraft, which has since been the despair of the world, so magnificent are its flights of tragic intensity, in spite of a strangely primitive series of dramatic conventions. The Greek drama originated, as did the English drama 2,000 years later, as a religious exercise. It began with a chorus in honor of some god, especially Dionysos, god of fruitfulness. Out of this sprang the role of chorus-leader, who improvised and, later, memorized lyric interruptions, interspersed with a narrative or story, telling some episode in the history of the god. To this chorus-leader was added an actor, who took the part of one character of the drama. This was the earliest form of Greek stage play. Thespis, who wrote at about the time of Pisistratus, tyrant of Athens, felt himself bound by this *convention* or unwritten law of stagecraft, to have never more than one actor in any play.

The first of the three greatest Greek dramatists was Aeschylus. His improvement in technique was to add a second actor to the meagre equipment of Thespis; and no one of the seventy dramas of Aeschylus had more than two actors, a chorus-leader, and a chorus, on the stage at the same time. Of course, the two actors could each play many roles, disappearing and reappearing on the stage as some new person; but not more than two actors could be seen simultaneously. We have seven of the plays of Aeschylus surviving, three of them forming a trilogy, or related group of three plays, called the *Oresteia.* Of the many Greek trilogies, this is the only one that has been preserved entirely.

The themes of Aeschylus are religious or mythological, dealing with the power of the gods to chastise men for sinfulness and pride. Above the gods hovers a vaster god, Fate, whose decrees no one can escape. The fundamental attitude of the Grecian dramatists was the opposite of free will: man was a slave, bound by the terms of life to inevitable punishment for man's inevitable faults.

The production of a Greek play, compared with the naturalness of modern drama, was a stilted and artificial thing. The faces of the actors could not be seen, for all wore masks—the actors in a comedy wearing faces wried into a perpetual grin, the actors in a tragedy hidden behind false-faces warped into mournful hideousness. The comic actors wore the sock, a heelless shoe; the actors in tragedy had their height artificially increased by the buskin, a high-heeled shoe. Action was practically forbidden, insofar as the sight of the audience was concerned; events took place off stage, and were at once reported to the audience through the artificial utilization of an ever-handy messenger. Yet that more poignant action, the sight of a man or woman torn by tempests of passion, was present in the highest degree. The plays consisted of a recited narrative, with interspersed lyrics uttered by the chorus. This chorus held an impartial knowledge of the wills of the gods, above the stumbling steps and sorrows of the hero and other characters; and the play consisted in a poetic dialog between these actors and the chorus. The speeches reached an emotional grandeur, an utterance of the workings of the tortured human heart and will, which no dramatist since has excelled.

The *Agamemnon* of Aeschylus has been adequately translated by Robert Browning and the *Prometheus Bound* by Browning's wife, Elizabeth Barrett Browning. These plays were given in competition for prizes; and, to his chagrin, the old Aeschylus, so long undisputed master of the dramatic stage, at last saw the first prize awarded to a 28-year-old poet, Sophocles. From this time on, the plays of Sophocles continued to win uninterrupted acclaim, until the death of the dramatist at the age of ninety, about 400 B.C. Sophocles wrote more than one hundred plays, of which we possess only seven. With great technical daring, for the period, this master of stagecraft added a third actor to the two allowed by Aeschylus; and no Grecian dramatist went further than this. Such plays of Sophocles as *Oedipus the King, Oedipus Colonus,* and *Antigone,* are still produced before modern audiences, often with an approximation of the ancient Greek setting; and they are still profoundly moving. I have played the part of Creon in the last-named of these both in Greek and English, and have found the audience responsive alike to both renditions.

Two of these three plays dealt with the life of Oedipus, using material with which we became familiar in our study of psychology. The essence of the plays, the son's desire for his mother and hatred of his father, made these the most acceptable of all plays, from the standpoint of the audience. For any spectator enjoys a play in proportion to the extent to which he can identify himself, his aims, dreams, and achievements, with the personality, aims, dreams, and achievements of the hero. We hail as great that which most nearly expresses our own desires: there is no other test, to any one of us, of greatness. Greatness in the extended sense means the general recognition, over a long stretch of time, and covering successive generations of critics and enjoyers, that the poet has phrased general desires or wish-fulfilments. The sincere poet, dramatic or otherwise, can only utter his own desires, and can not conscript greatness for himself. Only if his desires chance to coincide with the general desires will greatness be attributed to him. There is no other ultimate test of greatness than this: that men ultimately see themselves accurately pictured, as they would have themselves be, in the art product. Thus, when Oedipus eats the fruit of the forbidden tree, and stumbles forth blindly to his doom, the spectator partakes of the rapture, and accepts the picture in his conscience-fettered consciousness by reflecting that the wages of sin is the lashing of fate. What has appealed to the spectator is primarily the rapture, and not the doom; the doom is not enjoyed, unless the spectator is of that warped class of masochists who enjoy suffering; or unless, by an altered outlook, the hero can be at this point disassociated from the spectator, and condemned, by man's more widespread sadism, or love of seeing the suffering of others, to meet the agonies that so many of us desire to mete out to others.

Third and last of the greatest tragic Grecian dramatists was Euripides, a contemporary of Sophocles; eighteen of his ninety plays have escaped the harsh winnowing of time. His plays are less primitive and more sophisticated in handling than those of the two earlier masters; the theme of love occurs oftener. Moreover, Euripides deals more with human motives, and less with divine interference, than Aeschylus and Sophocles. Man was already passing, at this period, out of the religious stage into the metaphysical or philosophical; he had begun to realize that heaven and hell, fate and doom, were, in the strong man or woman, internal, and not external compulsions. Thus Euripides marks a step toward a more mature or modern outlook.

As great in a different sense was Aristophanes, chief of the Grecian comic dramatists. Greek comedy enjoyed a freedom of criticizing current life, largely absent from our stage; Aristophanes did not hesitate to place celebrated contemporaries on the stage, and ridicule them unmercifully. Political and social vices were castigated by him with unsparing frankness: the result is a picture of Athenian follies and foibles terrible in its accuracy. Eleven of his plays survive. Two assail Cleon, the political demagog who ruled Athens at the time; *The Clouds* punishingly caricatures Socrates; *The Frogs* pokes riotous fun at Sophocles and Euripides; two more are attacks on war, especially on the interminable warfare with Sparta which ultimately wrecked the Grecian city-states. *The Birds,* a satire on Athens, and, indeed, on the whole human race, is a sharp social fantasy. Throughout all of them, the poetic mood is high. Aristophanes stands well beside Cervantes, Rabelais, Swift, Shakespeare, Voltaire, Anatole France, and the few other human masters of the comic.

No Grecian comic dramatist of the stature of Aristophanes came after him. The New Comedy of Menander and his followers was far gentler, and has hardly disturbed the current of man's opinions. With the end of the great age of Pericles, the blood of Greece had been so thoroughly drained, by the awful hemorrhage of endless warfare, that only an anemic race of shadows persisted in the shadow of the great geniuses who had made the court of Athens the marvel of the world. For this is one of the prices of warfare: that, engineered by the old, it feeds on the young; and the young are the achievers of the future, and with their death the future dies, except as carrion to feed winged and human vultures. Moreover, war destroys present and future leisure; and leisure midwives art. Greece bled to death; and with it the great age of Greek literature dulled forever on the pages of man's progress.

GRECIAN PROSE

Historical writing, as such, is hardly a part of literature, using the latter word in its highest sense. For literature is restricted to that poetry and prose which appeals to the high and noble instincts, and their opposites; and dull prose has no such appeal. Historical writing, or any writing, may be so lit by the fire of genius that it thrusts its way home to the hearts of men; and this brings it within the scope of our survey. Greece of the age of Pericles possessed three historians, so skilled in story-telling that they have written themselves down as great. The first of these was a bird of passage named Herodotus, born in Halicarnassus in Asia Minor, domiciled for years in Athens, and dying in a Greek colony in Asia Minor. His theme was the triumph of the Greeks over the hordes of invading Persians. He wrote in the grand manner of the epic poets; he praised and blamed his own countrymen with shrewd insight, and did not fail to pay tribute to what was worthy in the Persian foemen. His story, whatever its inaccuracies, is told with tremendous movement and sweep. His *History of the Persian Wars* contains a brief summary of world history before the time of the conflicts, and is a source of much of the scant knowledge we receive from the ancients of themselves and what preceded them.

Thucydides, his successor, took part in the Peloponnesian War between Athens, Sparta, and the other Greek states, and wrote the chronicle of this warfare. There was no periodical literature; but Thucydides took notes even during the progress of the battles, and, as a participant in the stirring events, his acquaintance with the leading men of the time, and their aims and failings, permitted him to give a surprisingly honest account of the war. A creative artist by nature, he did not hesitate to invent long speeches for the warring leaders; and, suffering under the illusion of the near, he regarded this particular war among these insignificant Greek states as the important event of all history. Thus the sense of proportion is lost. For the important chapter in man's history is not the national blood-lettings called war, but the peacetime progress. Yet Thucydides so dramatized the blood-feuds of long ago, that he ranks among the masters of ancient prose.

Another man of action, who was historian as well, was Xenophon. He was the Grecian general in charge of the 10,000 mercenary allies of a pretender to the Persian throne; and in the *Anabasis,* or Retreat, he tells the wanderings of these paid soldiers back to their far homeland. His cry of the Greeks, when at last they sight the sea that means home, "Thalatta! Thalatta!" (The sea! The sea!) is one of the most poignant cries in history. Xenophon also gives us, in his *Memorabilia,* an intensely human portrait of his master, the philosopher Socrates.

Oratory reached a high stage in the times of Pericles, and afterwards. The great Athenian statesman was perhaps second among all Grecian orators in majesty and intellectual appeal. His orations are not preserved; but Thucydides has composed and credited to him a funeral oration over the Athenian dead, which at least reflected the ideas and idealism of the orator, in words throbbing with a glorification of the Athenian spirit. The climax of the speech is:

> And in the matter of education, whereas our adversaries from early youth are always undergoing laborious exercises which are to make them warlike, we live at ease, and yet are equally ready to face the perils which they face. . . . If then we prefer to meet danger with a light heart but without laborious training, and with a courage which is gained by habit and not enforced by law, are we not greatly the gainers?
>
> We are lovers of the beautiful, yet simple in our tastes; and we cultivate the mind without loss of manliness. . . . To avow poverty with us is no disgrace; the true disgrace is in doing nothing to avoid it. . . .
>
> To sum up: I say that Athens is the school of Greece, and that the individual Athenian in his own person seems to have the power of adapting himself to the most varied forms of action, with the utmost versatility and grace. . . .
>
> I would have you day by day fix your eyes upon the greatness of Athens, until you become filled with the love of her; and when you are impressed by the spectacle of her glory, reflect that this empire has been acquired by men who knew their duty and had the courage to do it, and who in the hour of conflict had the fear of dishonor always present to them.

In the age of Alexander, the prose romance sprang into being—that forerunner of the world's dominant form of literary activity today, the novel. This marked the slow alteration of man's expression from direct emotional utterance, or poetry, to direct utterance dictated by the intellect, in the form of realistic fiction and scientific writings. The twilight of poetry, as the dominant form of artistic expression, is reached when man as a whole begins to think rather than merely to feel.

While Greece hung spellbound upon the marvelous orations of Demosthenes, warning the land against the danger of Macedonian engulfment, prose romances and personal memoirs were beginning to foretell the subsidence of the continent of poetry, and the emergence of the mountain ranges of prose. There would still be, in races in early processes of mental discipline like the Teutons that overspread Europe, resurrections of the emotional cry called poetry; but the new form of utterance had begun to creep on its belly over the face of the earth, soon enough to arise and walk, dwarfing to pygmy size the poets. Among the early prose romances was *Daphnis and Chloe,* written by Longus 500 years later. Compared to modern fiction, this is somewhat artificial and uninteresting; but it was a voice crying in the prosy dawn.

ROMAN POETRY

Just before the time of Augustus, Rome produced its first impressive poet. In literature, Greece was the teacher of Rome; and a stubborn enough pupil she found the bloody-handed race of military conquerors. The first of her poets was one of her most noble. This was the philosopher Lucretius, who embodied his view of the universe in a tremendous poem, forecasting, by a poet's intuition, supplemented by a philosopher's intuition, many of the later developments of man's thought, such as the abiding truth of evolution in human progress. At about the same time Catullus, a lyric poet of much beauty living in Cisalpine Gaul, or Gaul this side of the Alps, wrote exquisite songs.

The Augustan age is called the golden age of Roman literature. Greatest of the literary figures was Virgil, the national epic poet of Rome. He had had a sort of forerunner in Ennius, whose long *Annales,* written a hundred years before, had sought to catch the spirit of his race. It took the leisure from warfare that the Augustan age afforded to produce a full flowering of poetry. Virgil's first product was his *Eclogues,* pastoral poems of Italian life based upon the idylls of Theocritus. Virgil's shepherds and gods are artificial imitations of the Greek models; but the general humanity of Virgil gives some life to the poems. The *Eclogues* were followed by the *Georgics,* which were genuine nature psalms, based upon a primitive "back-to-the-land" movement then popular among the sophisticated nobles of the Augustan court. The genius of Virgil was more at home in these simple pictures of the joys of farm life, than in the grander sweep of the epic which followed.

This epic is the *Aeneid.* The writing of this poem Virgil regarded as a patriotic duty; its real hero is not the semi-mythical Aeneas, a Trojan fugitive from the Grecian sack of his home city, but the city of Rome itself, the eternal task-mistress and harlot of the nations. The mechanism of the poem deals with the wanderings of Aeneas, on his way to found the parent city of Rome. During his voyage of seven years, Aeneas lands at Carthage, on the north coast of Africa. Its queen, Dido, falls in love with the bronzed wayfarer, and to please her he tells the story of the fall of Troy, and of the wooden horse by which the Greek chiefs surprised the careless Trojans. Dido does her best to detain Aeneas in Carthage; when he, ordered by the gods, leaves her, she slays herself out of unrequited love. Like Odysseus, Aeneas is escorted through Hades; and in Elysium, the home of the blest, the future glory of the city he is to found is revealed to him. On his return from the land of spirits to the mouth of the Tiber, Aeneas is welcomed by the local king, marries his daughter, and founds the fabled city which later is the mother of Rome. Thus the mechanism of the Greek epics was utilized by a poet of civilization, to extol his world-conquering city.

Virgil, born in 70 B.C., died in 19 B.C., leaving instructions that his great poem be destroyed; for he had intended to spend three years more in perfecting it. The emperor's decision overruled the poet's wish, and the manuscript has been preserved for us, among whom it occupies an unloved place in high school courses in elementary Latin.

A brilliant and delightful contemporary of Virgil was Horace, the most companionable of all the Roman poets. Son of a slave, his personality so impressed Brutus, that the latter placed him in command of a legion. The great patron of Roman poets, Maecenas, presented Horace with a little Sabine farm in the valley of Ustica, and here Horace exiled himself, to dwell at ease in the peaceful countryside. His *Odes* are the essence of light society verse; his *Satires* are playful and sophisticated; his *Epistoles,* the model of countless later effusions, are full of practical common sense and constant grace of expression.

Ovid, another contemporary, is remembered chiefly for his *Metamorphoses* (or, Transformations), the stories of all the changes into men and beasts recorded of the gods in the Roman mythology. Banished for his last years to the shores of the Black Sea, his haunting verses bewailing his fate keep his memory gently alive. The minor satires of the Spanish Romans, Lucan and Martial, were succeeded, a century later, by the biting social etchings of Juvenal,—

> Who would not, reckless of the swarm he meets,
> Fill his wide tablets, in the public streets,
> With angry verse? when, through the midday glare,
> Borne by six slaves, and in an open chair,
> The forger comes who owes this blaze of state
> To a wet seal, and a fictitious date;
> Comes like a soft Maecenas, lolling by,
> And impudently braves the public eye!
> Or the rich dame, who stanched her husband's thirst
> With generous wine, but drugged it deeply first!
> And now, more dexterous than Locusta, shows
> Her country friends the beverage to compose,
> And, midst the curses of the indignant throng,
> Bears, in broad day, the spotted corpse along.

This is one of his milder moods. This ends the poetry, but for a mention of the comic dramatists, the vulgar Plautus and the more refined Terence, both of whom modelled their work upon that of Menander, a tepid follower of Aristophanes.

ROMAN PROSE

The first Roman historian was a Greek slave, Fabius Pictor. Cato, in his *Origines,* wrote an early history of Rome, as did the Greek Polybius. None of these were distinguished; but the historical writings of Julius Caesar are worthy of higher mention. In the *Commentaries* on his own Gallic wars, and on the civil war between himself and Pompey, Caesar wrote contemporary history, after making it; and his writing was as simple, clear, and concise as his actions were. His object was to justify his deeds in the eyes of Rome; but he was wise enough to see that this could best be done without exaggeration or boasting. His reports remain a model of simple classic Latin.

The first memorable objective historian was Sallust, who had grown rich as governor of Numidia in Africa. When his master, Julius Caesar, was assassinated, Sallust retired to his magnificent country place, and composed his histories at leisure. We have, of his works, his account of the hectic conspiracy of the democratic demagog Cataline, and the history of the war between Rome and Jugurtha, a king of Numidia. During the same period, Cicero stood as the arbiter of letters, from his eloquent orations and his graceful essays upon many subjects.

During the age of Augustus, Livy wrote his memorable history of Rome from the founding. He was suffused with the illusion of the golden past—that common human attribute of regarding bygone times as far happier than the present. His history is far from accurate in many places; but it affords a vigorous running narrative of what the Romans chose to believe was the past of their empire. Shortly after him Tacitus wrote, his *Germania* constituting our chief source of knowledge of the Teutonic ancestors of much of modern Europe. Writing from the moral standpoint of scolding the Romans for their faults, Tacitus nobilified the German barbarians much as later writers made "Lo, the poor Indian" a pathetic figure of noble grandeur, instead of a barbarous human being, suffused with superstition and narrow prejudices. Tacitus also wrote the history of his own century, unsparingly revealing the faults of the emperors close to his own time.

At the time of Livy, Diodorus, a Sicilian Greek, wrote the first history of the world. Soon after him came the valuable history of the Jews written, in Greek, by Josephus, a Hebrew. Later Roman prose included the *Letters* of Pliny the Younger; the delightful romance, *The Golden Ass,* by Apuleius; and the charming moralistic *Lives* of Plutarch, a Boeotian. We have omitted the important writings of the Greek and Roman philosophers, since they will be dealt with separately in Book VI: *The Outline of Philosophy.* Soon after the time of Plutarch, literature was usurped by the Christian theologians and the opposing Neo-Platonists (New Platonists); and, with these, literature largely vanished from the Occidental earth, for a hibernating period, to burst forth again in the precursors to the European Renaissance.

ADDITIONAL READINGS

Greek and Roman Poetry. There is no inspired translation of any Greek or Roman poet. The renditions of the Greek dramatists by Gilbert Murray are perhaps the best; those by English poets (the Brownings, Swinburne, Pope, and others) are in reality poetic products of the English poets, lacking original inspiration or close kinship with their originals. Any adequate prose translation of Homer, Theocritus, the Greek Anthology, Virgil, Horace, and Lucretius will give close contact with the meaning of the originals.

Greek and Roman Prose. Cheap adequate translations of the Greek and Roman historians, orators, and romance writers are obtainable in many standard editions.

III. The Literatures of Europe

FRENCH LITERATURE

During the middle ages, from 500 to 1450 A.D., the themes of literature, receiving endless embroidering, were few. The classic races contributed the stories of Alexander the Great, Julius Caesar, and the "matter about Troy," centered chiefly about the story of Aeneas and Dido; each of these became the subject of a whole cycle of romances. The Celts contributed their great King Arthur as a romantic hero, the dominant figure in the stories of the Round Table and the Holy Grail. The Teutons contributed Charlemagne, and his cycle of wonders. An early Norman poet of the island of Jersey wrote out the Arthurian cycle; this received wide development in medieval France.

The land itself was divided into two sections, the north and the south. The southern French poets, centered around Provençe, matured earlier. From the first recorded song of Guilhem de Poitiers, about 1090 A.D., this literature flourished for more than a century, cresting in the work of Bernart de Ventadorn, Bertran de Born, and Arnaut Daniel; by 1250, the decline had set in. The troubadours or love-singers of Provençe sang for the rewards and applause of the knights and ladies of the land. Their theme, expressed in elaborately formalized verses, was that branch of love which might be called lady-service; the beloved was usually a married woman, and the formal love-making involved small impropriety. The typical attitude appears from this couplet by Aimeric de Pegulhan:

"Lady, for you great torment must I bear."
"Sir, you are foolish, for I do not care."

The whole culture of the land was wiped out by a religious crusade led by Simon de Montfort; efforts of modern French poets like Frédéric Mistral to revive it are foredoomed to failure.

The first northern French poetry to come to flowering was the *chanson du geste,* the song of noble deeds. These dealt with all of the medieval themes referred to. The masterpiece among these is the *Chanson de Roland,* the story of a knight of Charlemagne, who died in the retreat through the Pyrenees, after magnificently throwing down his gauntlet to God. Two important early French poets were Marie de France and Chrétien de Troyes, the first a dweller in the English court of Henry II, whose wife was a Provençal princess, and the second the author of narratives, *Knight of the Lion, Eric and Enid, Knight of the Cart, Lancelot, Percivale,* and *Tristan,* which are unrivalled among early French productions. France also produced at this period a rich harvest of fables, or beast-tales, of which the later fables of La Fontaine are splendid examples; of allegorical or moral poetry, of which the *Romance of the Rose,* by William of Lorris, first half of the 13th century, and Jean de Meung, writing two generations later, is the best; and of lyrics, or songs, sung by royal poets as well as by commoners. In the 15th century, three poets stand out—Charles d'Orleans, François Villon, and Clément Marot. Opposed to the Duke of Orleans was the glorious vagabond Villon, poet, thief, and lover of duchesses and prostitutes. His two *Testaments,* the *Greater* and the *Lesser,* contain many of the best ballades ever written. The ballade is a conventional 28-line French verse form, with rigid rhyme and rhythm. Marot, by contrast, was a gentleman, writing elegant *vers de sociéte,* or courtly light verse.

The Renaissance awoke in France the *Pléiade,* a group who broke away from old French poetry, making the newer poetry utterly stiff and formal. The first great tragic poet in France is Pierre Corneille, whose life almost covered the 17th century. His dramas still hold the stage today, and dominate subsequent French stagecraft. His plots are skillfully constructed, tense, and full of action; his grasp of human nature is firm. Jean Racine, his younger rival, using Greek, Roman, and Biblical themes, wrote dramas coldly passionate. More scintillant was the great comic dramatist, Moliére, one of the outstanding comic writers of all literature. His art was genteel caricature at its highest; his technique, swift action. A great poetic critic, Boileu, dates from the same period.

The 19th century saw French poetry divided into the Byronic Romantics; the Parnassians, reverting to the cold classic elegance of former French poetry; and the Symbolists, who used a single idea to represent a mood, as the raven in Poe's poem typified his conscience. High among the Romantics were André Chénier, the ballad singer Béranger, and Lamartine, whose *Meditations* has the fresh spontaneity of the English Romantics, Burns and Blake. Foremost of all was Victor Hugo, that impassioned prince of poets and romanticists, who held the French throne of letters for half a century. In his rioting melodramas, his spirited prose novels, and his lyrics and dramatic poems, he stands in the eyes of many as the chief poet of the 19th century—an opinion which many local and world critics regard as a distinct overstatement. Melancholy Alfred de Musset, dramatist and poet, has not impressed the English world as firmly as his more violent master.

Among the classic Parnassians, Theophile Gautier, Leconte de Lisle, and the evil beauty of Charles Baudelaire are preeminent. The sonnets of Hérédia are astonishingly beautiful; the audacious poems of Richepin largely closed the Parnassian period. Outstanding among the Symbolists are Stéphan Mallarmé, Paul Verlaine, and the prodigy Rimbaud. The Belgian poets Verhaeren, a French industrial Walt Whitman, and the mystic dramatist and poet Maurice Maeterlinck, together with Paul Fort, the strange writer of polyphonic prose, an amorphous poetic form, bring the roll down to the present.

In prose, the 16th century saw Rabelais, one of the great comic geniuses of all time, saturated with a healthy animal vulgarity. His gigantic hero Gargantua, the latter's son Pantagruel, and the amiable do-naught, Panurge, are unforgettable additions to man's hall of comic fame. Montaigne, contemporary of Rabelais, is the author of essays penetrating and always graceful. In typical Whitmanic mood, he says, "I myself am the groundwork of my book." The great

Descartes and Pascal must be relegated to the philosophers and scientists; but the religious controversialist Bossuet, by his tremendous vigor, earns mention here, as the head of French letters of his time. La Bruyère and La Rouchefoucauld uttered maxims, or those brilliant critical sentences called epigrams, which are still read with delight.

The novel developed first in the work of Le Sage, whose *Gil Blas* is still regarded as a masterpiece. This is a novel of objective experiences, rather than of subjective insight: the method of Walter Scott, rather than of George Eliot. L'Abbé Prévost's little romance, *Manon Lescaut,* is an isolated work of genius; the 18th century, that gave it birth, is characterized chiefly by the writings of French thinkers, Montesquieu, Voltaire, Rousseau, and Diderot, all rebels against the monarchic order of things, and all contributing to the French Revolution.

Early in the 19th century France gave birth to Balzac, Alexander Dumas, and George Sand, the novelists, and Saint-Beuve, the critic and essayist. Balzac's tremendous series of novels is called collectively *The Human Comedy,* ranging from studies of simple country girls and sophisticated courtesans, to epics of business trickery, and of human greed and selfishness. The marriage ceremony is seen rightly by him as an episode in life, and not its climax. These stories did not earn the acclaim awarded to Hugo's great melodramas, *The Hunchback of Notre Dame, Toilers of the Sea,* and *Les Miserables,* stories in which passion rages like a tropic hurricane. Dumas, with his *Three Musketeers, The Count of Monte Cristo,* and other vibrant melodramas, is dear to the American boy and his parent as well. George Sand found her stories in the hearts of herself and her beloved French peasants. Scintillant among all stood the critic Saint-Beuve; his message largely limited to his own land, but his writings a model of critical clarity and acumen.

The rationalist and critical aspect of the French mind appeared early in Renan and Taine—the former in the brilliantly sceptical *Life of Jesus,* the latter the author of the best *History of English Literature* available in any language.

The greatest and most perfect of French novelists, and perhaps of all novelists, was Gustave Flaubert, a painstaking craftsman whose *Madame Bovary* is hailed by many as the greatest novel ever written. Its theme is the sordid heart-affairs of a commonplace romantic woman, moving among mediocre men in a dull provincial town. His *L'Education Sentimentale* and the gorgeous *Salammbô,* placed in vanished Carthage, are as exquisitely written. His pupil, Guy de Maupassant, is the master of the epigrammatic short story. Emile Zola, giant among realists, piles detail upon detail like a shrewder Theodore Dreiser, until we stagger under the sheer mass of his case.

Greater than any of these but Flaubert is Anatole France, sceptic and satiric fictional commentator upon the whole human race. His *Penguin Island,* a history of Frenchmen clothed in the bodies of penguins, his *Revolt of the Angels,* his rollicking *At the Sign of the Reine Pedauque,* his exquisitely amiable *Crime of Sylvestre Bonnard,* as well as countless other charming stories, mark him as one of the world's greatest novelists. Lesser story-tellers were Prosper Mérimée, Alphonse Daudet, and the Goncourt brothers. J. K. Huysmans, ranging from realist to religious mystic, was a faithful chronicler of out-of-the-way human customs and attitudes. We must merely mention Pierre Loti and Marcel Proust, and the far more important trio, Romain Rolland, author of the magnificent ten-volume novel *Jean Christophe,* and other epic novels almost as moving; Henri Barbusse, whose *L'Enfer, La Feu,* and *Clarté* range from man's basest passions to gripping pictures of the world war; and one astonishing writer, Jules Romaines, whose *The Death of a Nobody* broadened the technique of the novelist, to include the thinking of the crowd, the stir in the human pool made by an unimportant happening to an unimportant man.

The literature of such a race as the French is a living and growing thing. Before next year, new stars may appear above the horizon, as great or greater than those of the past. The account of this, as of all human things, is happily an incomplete account; the past may be surveyed, but even while we glance at it, the future becomes the present.

ITALIAN LITERATURE

There are many early names in Italian and Tuscan literature, especially of poets following the Provençal school, and the northern French elaborators of the stock themes of medieval literature. But these pale before the name of Dante Alighieri (1265–1321). His *Vita Nuovo* is a high extollation of love, based upon his chance vision of a maiden, Beatrice, in his youth—a case of love at first sight, whose unfulfilled passion found wider development in the tremendous *Commedia,* the poet's journey through hell, purgatory, and heaven. The earlier poem is all airiness and spirituality, the human image of the beloved one gradually shifting, by a mechanism familiar in cases of mysticism, into the symbolic dream-love whom the poet idealizes.

When we reach the poem usually called the *Divina Commedia,* we find the poet far more tremendous in his concept and his vigorous execution. In his wanderings through hell, led by the spirit of Virgil, he lets saints and sinners tell their stories; and the stories of the great sinners, suffused with Dante's compassion, are far more moving than the lives of the blessed. Such an incident as the illicit love of Paolo and Francesca, in the 5th canto of the hell portion, is narrative poetry unexcelled by any other poet. Dante's own personal and political grudges animate many of his passages; and he necessarily was inspired by the strange, superstitious attitude of his age. The stanza form is the *terza rima,* a group of three-line stanzas closed by an extra rhyming line. Thus a concluding ten lines would rhyme as follows: 1st and 3rd; 2nd, 4th, and 6th; 5th, 7th, and 9th; 8th and 10th. To make this clearer, the rhymes might be: bay, cool, day; pool, before, stool; more, white, core; light. The poetic method of indicating this is to use one letter for each rhyming sound: as *a* for the rhyming sound -ay in bay and day; *b* for the sound -ool in cool, pool, stool; and so on. Then the ten-line stanza would be described as rhyming a, b, a; b, c, b; c, d, c; d.

At the time that Dante wrote, Latin was still the language of scholars and educated men. Audaciously Dante took the Tuscan dialect, and made it the language of Italy. The whole poem is a vast cathedral of symbolism: the forest in which the poet loses himself representing the civil and religious confusion of society; envy is Dante's home city Florence, torn by civil dissension; pride is the royal house of France; avarice is the court of the popes; Virgil stands for reason and the empire; and Beatrice, no longer an earthly love, stands preeminently for the supernatural aid that, Dante believed, man required in order to attain his supreme end, God. Greater than this artificial structure are the grandeur and delicacy of the poetic treatment.

A few years later, Petrarch became recognized as the head of Italian literature. A familiar of popes and emperors, he held three continuing attitudes which mark the modern man; discontent, melancholy, and incapacity for satisfaction. His love poems, especially his sonnets, are psychologically accurate, without the artificiality of the southern French troubadours. By his zeal for the classic literatures of Greece and Rome, he aided in ushering the Renaissance into Europe. His form of sonnet is called the Petrarchan or Italian form, after him; and consists of a fourteen-line poem in 5-foot iambics (an iambic being a foot of two syllables, the first unaccented, the second accented, as any of these words, which are perfect iambs: declare, denounce, astute, behold) and rhymed a, b, b, a; a, b, b, a, for the opening octave, or eight-line stanza; and either c, d, e; c, d, e, or c, d, c, d, c, d, for the concluding sestet, or six-line stanza. One of the finest Petrarchan or Italian sonnets in English is this magnificent one by William Wordsworth:

The world is too much with us; late and soon,
Getting and spending, we lay waste our powers;
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!
This sea that bares her bosom to the moon,
The winds that will be howling at all hours
And are up-gather'd now like sleeping flowers,
For this, for every thing, we are out of tune;

It moves us not.—Great God! I'd rather be
A pagan suckled in a creed outworn,—
So might I, standing on this pleasant lea,
Have glimpses that would make me less forlorn;
Have sight of Proteus rising from the sea;
Or hear old Triton blow his wreathéd horn.

Barring the identical sounds *ours, hours,* which is a false rhyme, the technique here is perfect. The assonantal rhyme or near rhyme *worn, horn* (or even more definite assonances, such as *won, tone; shame, rhyme; winter, hunter*) are coming into increasing favor in modern English and American poetry. But this is an inevitable anticipation.

Boccaccio, prince of story-tellers, lived at the same time as Petrarch. His poems are forgotten today; but his *Decameron,* a group of a hundred tales, is not only read with eagerness today, but has proved a mine of rich ore for Shakespeare and hundreds of the Italian's successors throughout Europe. None of the tales are stupid; and the few which possess a frankness irritating to an English ear, dulled by Puritanism, reflect more upon English lack of taste than upon Italian fictional creativeness. He developed Italian into a magnificently flexible language for prose; a century later, the statesman Machiavelli, in *The Prince,* applied the same speech to a shrewd, selfish analysis of statescraft. The *Autobiography* of the sculptor Benvenuto Cellini is still read with appreciative absorption, punctuated by constant chuckles. We have less patience with the more artificial *Orlando Furiosa,* a romantic epic by Ariosto, and the resounding narrative, *Jerusalem Delivered,* by Torquato Tasso.

After Tasso, Italy declined politically; and her literature declined similarly. Not until the 19th century has she emerged into impressiveness again. The *Memoirs* of Jacques Casanova mark the close of the 18th century, and possess all of Boccaccio's frankness, together with an occasional flare for dramatic narrative, as in the story of the imprisoned Casanova's escape from the Piombi. Goldoni was a writer of brilliant comic trifles for the stage. Among poets, Alfieri and the magnificent Leopardi are outstanding. Manzoni's novel, *The Betrothed,* is read with pleasure throughout

Europe. D'Annunzio is an Italian mystic, often obscure, but always impassioned, whether his activities be directed toward a drama, an ode, or the capture of a city like Fiume for his grasping motherland. The modern craze for experiments beyond the range of ordinary sanity has produced in Italy Papini, best known here for his recent reactionary *Life of Christ,* and Marinetti. Pirandello is the foremost dramatist, and his work, too, is tinged with the ultra-modern, securing fervid admiration and vigorous dispraise as well. We will consider this aspect of modern literature more fully, in the next two sections.

SPANISH LITERATURE

Spanish literature, during the centuries of the Moorish occupation, reached a high level of literary excellence, the alien-thronged land leading the rest of Europe at this time. The oldest literary fragment in the Castilian tongue, arising among the Spanish Christians, dates back to about 1150 A.D., and is a part of an old religious play, *The Mystery of the Magian Kings.* The National heroic poem is the *Poems del Cid* (poem of the Cid), its hero being Ruy Diaz de Bivar, a military commander against the Moors. *Cid* is the Arabic name for lord. In this ancient narrative poem, the Cid is a loyal servant of his king; in the slightly later *Cronica rimada del Cid,* he is almost a rebel, who dares to treat his sovereign as an equal. The *Poem* dates back to the middle of the 12th century, the other version perhaps a little later. The renown of this early hero spread throughout Europe, and Corneille made him the subject of a French tragic drama of great dignity.

Spanish prose writing awoke under the patronage and direct participation of Alphonso X, called "the Learned," a Castilian monarch of the 13th century. Later histories derive much from his *Crónica general,* which ranged from the semi-historical stories of the beginning of the world down through the reign of his own father. Alphonso served as a stimulus to the multitudinous medieval poets of Spain, and as a protector to the Provençal troubadours, fleeing from persecutions in France. Spain of the 16th century developed to prodigious lengths the Breton and French romances. Greatest of these was the *Amadis de Gaula*, originating in Portugal, but first set down in Spanish by Rodrígues de Montalvo. The mad exaggerations and hysteric marvels that marked these romances, and spread also into the vast dramatic and lyric literature of medieval Spain, grew to a mighty harvest in the work of Miguel de Cervantes, author of the world's greatest satirical romance.

Cervantes had been a sea-captain under Don John of Austria, in that idealist's hopeless triumphant stand against the Saracens at the sea battle of Lepanto. Cynical Cervantes drew upon Don John for part of the material for his immortal *Don Quixote* (pronounced Don Kee-ho-tee). The surface purpose of this book was to laugh outgrown chivalry out of existence. The mad knight Don Quixote, who mistook inns for palaces, chambermaids for princesses, humble villagers for mailed knights, and windmills for giants, is one of the most lovable figures in literature; his stupid ass-mounted squire, Sancho Panza, is almost as memorable. The telling is brisk, and the heavy surcharge of sympathy for his weird hero makes the book forever human and cherished. When a rival novelist issued a spurious sequel to the first volume, Cervantes in anger wrote a sequel possibly better than the original story. The total remains one of the literary glories of Europe.

Yet Spain was slowly bleeding back into barbarism, due to the Inquisition, and the suicidal expulsion of the Moors and the Jews; her military and literary prowess crumbled together. One of the sailors in the great futile Armada, that sailed to humble England and returned in defeat at the hands of the British and the storms of heaven, was Lope de Vega. He was the real founder of the Spanish theatre, and the literary dictator of Spain during the 17th century. It is claimed that he wrote more than a thousand plays; his fecundity had the inevitable result, that no work of his stands out as permanently memorable. His successor was Calderón, who was more the poet than the dramatist. At the same time the Portuguese poet Camoens, a seafarer who had faced the ocean surges in tiny ships, was writing his exquisite poems; his epic treatment of the exploits of Vasco de Gama, the great Portuguese navigator who first rounded the Cape of Good Hope and opened the searoad to India, is the greatest sea-poem between the Odyssey and John Masefield. This poem, the *Lusiads* (named from Lusitania, the legendary name of Portugal) made Portuguese a language, much as Dante had made Tuscan the Italian speech, and Chaucer made an English dialect the world-girdling English language.

In the 19th century, the dramatist José Echegaray looms out, in a series of dramas ranging from romances to social problem plays influenced by Ibsen. Jacinto Benavente, born in 1866, is just now reaching the English and American stage. The novel saw early in the century *The Sea Gull* and other stories by a woman signing herself Fernán Caballero, and *The Cocked Hat* by Pedro Antonio de Alarcón, an excellent adventure story. José María de Pereda founded the modern school of realistic fiction in Spain. He is a masterly delineator of sailors, fishermen, and country folk; his art becomes a trifle stilted when he turns to deal with townsmen. Pereda's rival, Juan Valera, lacked the stern Christian pessimism of the former, but makes up for this with a gentle sophisticated raillery and a wider knowledge of sophisticated women and men. His *Pepita Jimínez,* telling the downfall of a mystical saintly priest when faced with the temptation of a woman's body, and his memorable *Dōna Luz,* draw two fascinatingly seductive patrician women, who breathe life throughout.

One of the highly productive writers was Benito Pérez Galdós, with a series of novels of almost epic proportions, which he grouped together under the title of *Episodios nacionales.* These stories throb with brilliant coloring, stirring episodes, and a suffusion of patriotism; they labor under the faults of wordiness, loose construction, and a style raggedly uneven. Even more of a naturalist in fiction is Palacio Valdes, whose early promise, based upon stories strictly Spanish, thinned out and became diluted when he adopted a Gallic mannerism and a wider range. A brilliant woman novelist is Emilio Pardo Bazán, with powerful repellant pictures of peasant life, and audacious innovations in morality. Among living novelists, Pío Baroja enjoys high reputation, as interpreter of the alley and backstreet life of the modern city, and as depicter of the conflict between various social classes.

Vicente Blasco Ibanez is the modern Spanish novelist most widely read through the English-speaking world. His early treatment of Spanish village themes, as in *The Cabin,* showed a powerful hand revealing the unguessed power of the dumb peasantry against their rulers. Other novels, such as *Blood and Sand* and *La Bodega* (The Fruit of the Vine) deal with such curses of Spanish life as bullfights and drunkenness. His lesson widens in the tremendous *La Catedral* (*The Shadow of the Cathedral*), to a treatment of the way in which a wise teacher's words are always perverted, in the ears of his more stupid followers. *La Maja desnuda,* published in English as *Woman Triumphant,* is a stirring psychological story, evidently influenced by Zola. His later works, such as the popular *Four Horsemen of the Apocalypse* and *Mare Nostrum,* dealing with the world war, and even cheaper successors, show the progress of a novelist who has yielded to popular acclaim, and the financial rewards of writing superficial best sellers. He might be called the Spanish H. G. Wells; with the difference that the gifted Englishman errs by excess exuberance and occasional loose thinking, while the more gifted Spaniard apparently voluntarily sold his birthright of ability for a mess of royalty pottage.

There are other Spanish novelists of high repute in Spain, and a vast number of poets and prose writers. But the work of these has not yet penetrated the English-speaking world, and a mere listing of their names would serve here no good purpose.

GERMAN LITERATURE

The first notable flowering of literature in Germany was the period of the Minnesingers, or love-singers, who appeared toward the end of the 12th century, partly inspired by the burst of formal love-music from southern France. The general situation in these love songs, that of the love of the singer, ordinarily a knight of the lower orders, for some lady socially far above him, was similar to that of the French poets; but there is far less artificiality, and far more heartfelt sincerity, in the German songs. They are the real ancestors of the German *lieder* or songs, among the world's loveliest brief poems.

Greatest of the Minnesingers was Walther von der Vogelweide, whose singing was the strumming of a lute whose strings were his own heart-strings. One of his peers was Wolfram von Eschenbach, both a Minnesinger and the first shaper of the epic story *Parzifal,* dealing with one of the famed knights of Arthur's court. Thus he was both love-singer and master of the second form of medieval German poetry, the court epic. Beside him in this field stood Hartman von Aue and Gottfried von Strassburg; the latter's *Tristan* is gay and radiant, compared with the heavy gloom of Wolfram's better-known poem. The Arthurian cycle of stories furnished the general theme for these court epics.

Above both of these types of poetry was the national epic, whose chief exemplar, the *Niebelungenlied,* or Song of the Niebelungs, received its form in Austria in the 12th and 13th centuries. Based largely upon the lower Rhine legends gathered around the mythical hero Siegfried, this became the chief expression of German medieval spirit. It and its successor *Gudrun,* written early in the 13th century, furnished the content for the most magnificent flowering of grand opera, the *Niebelungen Ring* of Richard Wagner.

Thus the beginning of its literature saw the high lyric beauty of Walther von der Vogelweide, the most influential of all Germany's lyric poets; the production of Wolfram's *Tristan,* the most perfect of all the European tales of chivalry; and the *Niebelungenlied,* which stands high among genuine folk epics. The strangely broken condition of Germany, politically, for the next few centuries, was one of the major forces retarding the production of a truly national literature. The integrating force of the great religious reformer Martin Luther gave the race a language, as we have seen in the cases of Dante and others. More than his keen religious tracts, Luther's vigorous translation of the Bible into *Gemeinstdeutsch,* or common German, based upon the language of the Saxon chancery, gave the race the modern German literary language. As a hymn writer, author of *Geistliche Lieder,* or sacred songs, Luther was equally careful to write in a language that would be understood the breadth and length of his land. His magnificent hymn, *Ein Feste Burg Ist Unser Gott* (A Mighty Fortress Is Our God) is one of the great national religious hymns.

One of Luther's opponents, the Alsatian monk Thomas Murner, developed the language into a tremendous weapon of scurrilous scorn, in the floods of satire he poured upon the Protestant cause. His *Von dem lutherischen Narren* (On the Lutheran Fools) was the height of this abuse; and the belated satirical replies of Johann Fischart lacked the poisonous sting of the earlier assaults.

Poetry began to flourish, in the hands of the Meistersingers or master-singers, who sought to carry on the traditions of the half-forgotten minnesingers. Leader among these was Hans Sachs, a cobbler of Nuremburg, and a stanch Lutheran. He was a prolific writer of prose, excellent verse, and undramatic dramas. Again the progress of literature was interrupted, this time by the Thirty Years War, which devastated Germany; and in the death of the young generations German literature died, for the time being.

When the Renaissance belatedly reached Germany, it found in the dry academician Martin Opitz a man who sought to draw German poetry and literature from French sources, much as Rome had thriven as parasite upon Greece. Among his followers were the epigrammatist Friedrich von Logau, a genius of the first rank in brief, brilliant verses, and the dramatist Andreas Gryphius, with his excessive formality. The period came to an end in the French tutelage of Johann Christoph Gottsched. Logau saw the folly of the Thirty Years War, and inveighed against it in bitter epigrams; a novelist, Christopher von Grimmelshausen, in his *Simplicius Simplicissimus,* took the same position. Then two literary reformers from Switzerland, J. J. Bodmer and J. J. Breitinger, urged Germany to turn from French models to English ones; from the cold sterility of Gallic literature to the pompous pedantry of John Milton, whose chief work Bodmer had translated into German.

Out of this murk of imitation of foreign models emerged the two first poets of the German classic age, Friedrich Gottlieb Klopstock and Christoph Martin Wieland. Klopstock's epic, *Der Messias,* animated with the awakened spirit of freedom in writing, and in a still higher degree his *Odes,* awoke the literature of the land. Wieland, far more scintillant than the sober and bardic Klopstock, is remembered today chiefly for his fairy epic *Oberon.* A great critical mind appeared in J. G. Herder, a man suffused with the idea of historical evolution, who studied the literatures of many lands, and opened them to his countrymen. He himself collected and published the *Volkslieder* or folksongs of many nations. As great a critic was Gotthold Ephraim Lessing, a man distinguished also in playwriting and scholarship. His style possessed a clarity, a wit, a charm, and an eloquence that make his writings highly readable today. His dramas, still seen on the stage, lack some of the human warmth of his critical writings; but they, too, are noteworthy.

And now, in the person of Johann Wolfgang Goethe, we enter upon the brief *Sturm und Drang* (storm and stress) period of German literature. As a youth, Goethe studied in Leipzig, then under the influence of Gottsched and the French models; and the young poet responded to this by writing verses in the conventional mood and mode. He went to Strassburg to continue his studies, and came under the influence of Herder, who soon persuaded the vibrant young disciple that there was more art in a simple folksong than in all the imitations of formal verse that were hailed as world masterpieces throughout Germany. Most of all, Herder introduced the young German master to the works of Shakespeare. This was the key that unlocked the sealed box; among the products of this hectic period was *Werthers Leiden* (The Sorrows of Werther), a sentimental romance which swept Europe, and gave Goethe at twenty-four a continental reputation. The indefatigable genius wrote also exquisite love songs, the first draft of his *Faust* (which he soon took to Weimar, not to finish for sixty years) and other novels and plays.

Seven years after the story of Werther appeared, Johann Friedrich Schiller's *Die Rauber* (The Robbers) was produced,—a gentler, more skilful example of stagecraft, which insensibly brought the Storm and Stress period to its close. In Weimar, Goethe passed through a fallow period of nearly ten years, followed by his visit to Italy and the production of classic dramas like *Iphegenie* and *Torquato Tasso,* as well as the lovely epic *Hermann und Dorothea. Wilhelm Meisters Lehrjahre* showed at last his mental and spiritual maturity. His friendship with Schiller deepened; the latter's magazine, *Die Horen,* and the volumes in which the two poets together published their splendid ballads, knit them closer together.

Goethe, director of the ducal theatre at Weimar, inspired Schiller to write his series of classic dramas beginning with the trilogy of *Wallenstein,* and ending with *Wilhelm Tell.* Under the stimulus of Schiller, Goethe brought to a close the final writing of *Faust.* This rewriting of the medieval legend of the student Faust, who bartered his soul to Mephistopheles, the devil, in return for a taste of the pleasures of life, alters the close of the legend to have Faust discover that eternal striving is the sole joy, the sole conqueror of the spirit of evil. Longer than *Paradise Lost,* like the English epic it has lost most of its charm for the modern reader. It still remains a treasure-trove of scholarship and impassioned poetry, dealing with problems that modern man has largely passed by. Schiller's death in 1805 really ended this classic period of German literature; although Goethe lived on for twenty-seven years of constant activity.

Romanticism in Germany originated less as a protest against the classicism of Goethe and Schiller, than as a rebuke to the shallow utilitarian rationalism of Berlin. The Romantics are lesser in stature than the great classicists. Friedrich Hölderlin was a gifted poet, but he could not stand beside the giants of Weimar. The hymns and fragmentary novels of Friedrich von Hardenburg, who wrote under the name of

Novalis, remain fragments; the dramas and fairy tales of Ludwig Tieck, one of the founders of the movements, are less than masterpieces. The great critic Schlegel produced his *Shakespeare* under the encouragement of this school, as did the Grimms, working in the field of philology and folk tales; the morbid stories of E. T. A. Hoffman show a decided decadent streak. Ludwig Uhland grafted the spirit of the Romantics upon German ballad poetry, but his best poems are marred by too much scholarliness.

Of the "Young Germans" who revolted against Goethe after his death, Heinrich Heine is the most famous. A Jew, bitterly conscious of prejudices against his race, his multitude of lyrics bewilder with their cynical sharpness, and their constant melting sweetness. His *North Sea* cycle perhaps holds, with a few scattered songs, the highest expression of his genius. Franz Grillparzer, Austria's greatest poet, and Heinrich von Kleist, a Prussian dramatist, both were forerunners of the modern subjective drama. Friedrich Hebbel was a greater dramatist than either. His dramas, placed in periods of human history when one standard of morality and civilization was giving way to another, are strangely dead to readers today; although *Maria Magdalena*, *Herodes und Mariamne*, and *Gyges and His Ring*, are tensely plotted and stirringly worded. Gottfried Keller, the most distinguished of Swiss writers, wrote in German; and his tales are well worth reading.

Greatest of all the writers who succeeded the Franco-Prussian War was the eccentric poet-philosopher, Friedrich Nietzsche, whom we will reach in Book VI: *The Outline of Philosophy*. Paul Heyse's stories and poems enjoyed a vogue, but are neglected today. A more impressive poet was Detlev von Liliencron; his successor, Richard Dehmel, lifted song higher toward truth and beauty of phrasing. Among other noted poets of the recent past were Hugo von Hosmannsthal and Rainer Maria Rilke.

These have had difficulty, except in the case of Nietzsche, in reaching the English-speaking world; the dramatists, Gerhart Hauptmann, Arthur Schnitzler, and Franz Molnar, have been luckier. Hauptmann excelled in his poetic plays, such as *The Sunken Bell;* his greatest achievements were in the form of realistic prose dramas, such as *The Weavers,* in which the hero is the whole group of oppressed laborers. Such plays as this, *Rose Bernd,* and *Drayman Henschel,* are as direct in utterance as the best of Ibsen. His novels fall far below the plays, both in conception and execution. Schnitzler, from Vienna, is a cynical depicter of a sophisticated society, with dazzling shafts of wit overcast with the inevitable decadence of his foam-world. Molnar is greatest in his *Liliom,* one of the most magnificent of all modern plays. He is always a clever playright, but rarely elsewhere reached the emotional heights of the play mentioned.

In the recent novels, Sudermann's *Song of Songs* and other stories fall far below the work of the two masters, Jacob Wassermann and Thomas Mann. Wassermann's *The World's Illusion* and *The Goose Man* indicate him a writer of tremendous passion and vigor, with a definite touch of mysticism—perhaps a heritage of his Jewish blood, for, like Schnitzler, Heine, and Hofmannsthal, he had Jewish ancestry. Mann is a more difficult and astringent writer. His one novel, *Buddenbrooks,* the story of the decline and distintegration of a patrican family in Lubeck, is one of the masterpieces of modern subtlety in fiction; and his short stories gleam and pulse with the authentic life of genius. The overturn of the World War is awakening a new crop of bled geniuses, who may lift in any hour a word in poetry or prose that will startle the overseas world.

RUSSIAN LITERATURE

Russian folk poetry commenced with the *byliny* (tales of old times), unrhymed, and preserving a haunting cadence. Their themes are Russian; and they have not yet reached Western ears, except in the embroidered form of Russian operas based upon the old tales. A famous prose *bylina* is the story of Prince Igor, also memorable for its adaptation into the opera of the same name.

The first author to receive a definite Occidental hearing was Alexander Pushkin, whose grandfather had been a gigantic Negro bodyguard of the tsar's. As lyric poet, dramatic poet, and story-teller, he stirred the emotions of all Russia. Among the operas founded on his poems and stories are *Boris Godunov, Eugene Onegin,* and *Rusalka.* The mantle of his clear, direct style fell upon Michael Lermontov, an exotic blend of Byron and Shelley. His *Who Can Be Happy and Free in Russia?* a folk epic, throbs with an understanding of the troubles of the people; his novel, *A Hero of Our Time,* laid in that Caucasus region in which he found most of his happiness, has penetrated in translation throughout Europe.

The typical mood of Russia, of a decadent pessimism, is found in Nikolai Gogol. His *Dead Souls* satirizes all classes of society in Russia, in unforgettably vivid portraiture. The tremendous *Taras Bulba* tells of the berserk warfare between the Russians and the Poles; and his weird imagination runs riot in stories like *Vii* (The Demon), *Memoirs of a Madman,* and *Portrait.* His effort was to detach the novel from tinsel romance, and let it speak realistically of life. Ivan Turgueniev, one of the world's greatest masters of fiction, carried further the theme of fiction as a depicter of life. *Fathers and Sons,* his most popular novel, paints the age-old strife between the upward scientific and intellectual yearnings of the young, and the duller home-loving aristocracy. A brief imprisonment and exile was awarded him by the autocratic government—what Russian writer down to the last decade escaped this? He continued in his mammoth work, with a grace of form that reminded strangely of the better French novels. Perhaps his most exquisite tale is *Asia.*

The novels of Feodor Dostoievsky pulse with riotous abandon, where Turgueniev is serene and restrained. Dostoievsky's *Recollections of the House of the Dead* gives a hideous autobiographical picture of his own Siberian exile; his *Crime and Punishment* is magnificent in its heart-rending realism. This deals with a brutal murder committed by a student through motives of morbid egotism; the student's confession at the insistence of his sweetheart; and their joint redemption during his Siberian punishment. *The Possessed* is a fictional preachment against violence as the midwife of progress; *Brothers Karamazov* deals with a theme worthy of Flaubert, the ethical problems presented in the lives of ordinary people. Lacking a sense of humor, his novels loom like gigantic formless chaos spewed out of the tortured soul of Russia.

Count Leo Tolstoy wrote out of his fulness of military achievements, long before he had matured into that thoughtful pacifism and philosophic anarchy which was his final political attitude. The immense welter of *War and Peace,* and the packed incidents of *Anna Karenina,* are the features of his best novels. The former compresses into one volume Russia of the early 19th century; the latter gives the slow degradation and suicide of the restless wife, who deserts a repulsive moralist of a husband for a callous lover, and who pays the penalties of society's callous code. These novels are a trifle dull to the reader today; the best stories of Anton Chekov still glitter with undiminishing luster. His fine satirical plays and flawless short stories rank him as a major artist just below the rank of the world's greatest.

Maxim Gorky wrote from the heart of the oppressed peasants; his *Mother* is perhaps his greatest sustained flight. Ivan Goncharov is remembered for one novel, *Oblomov,* a study of the "damn today and tomorrow" mental inertia of the hot-housed Russian intellectuals, as aimless as Kipling's banderlog, the unforgettable monkey-folk of India. Beside Chekov stands Leonid Andreyev, a disillusioned sceptic, whose intense stories, *The Red Laugh* and *The Seven That Were Hanged,* and dramas like *He Who Gets Slapped,* probe to the depths of Russian disillusion. Kuprin is another Russian whose stories and plays fascinate Western readers; and Artzybashev is memorable for his pictures of the egocentric Nietzschean superman roughshodding it over the world in *Sanine* and its companion study of a weaker Sanine, called *Breaking Point.* His drama, *War,* is masterly.

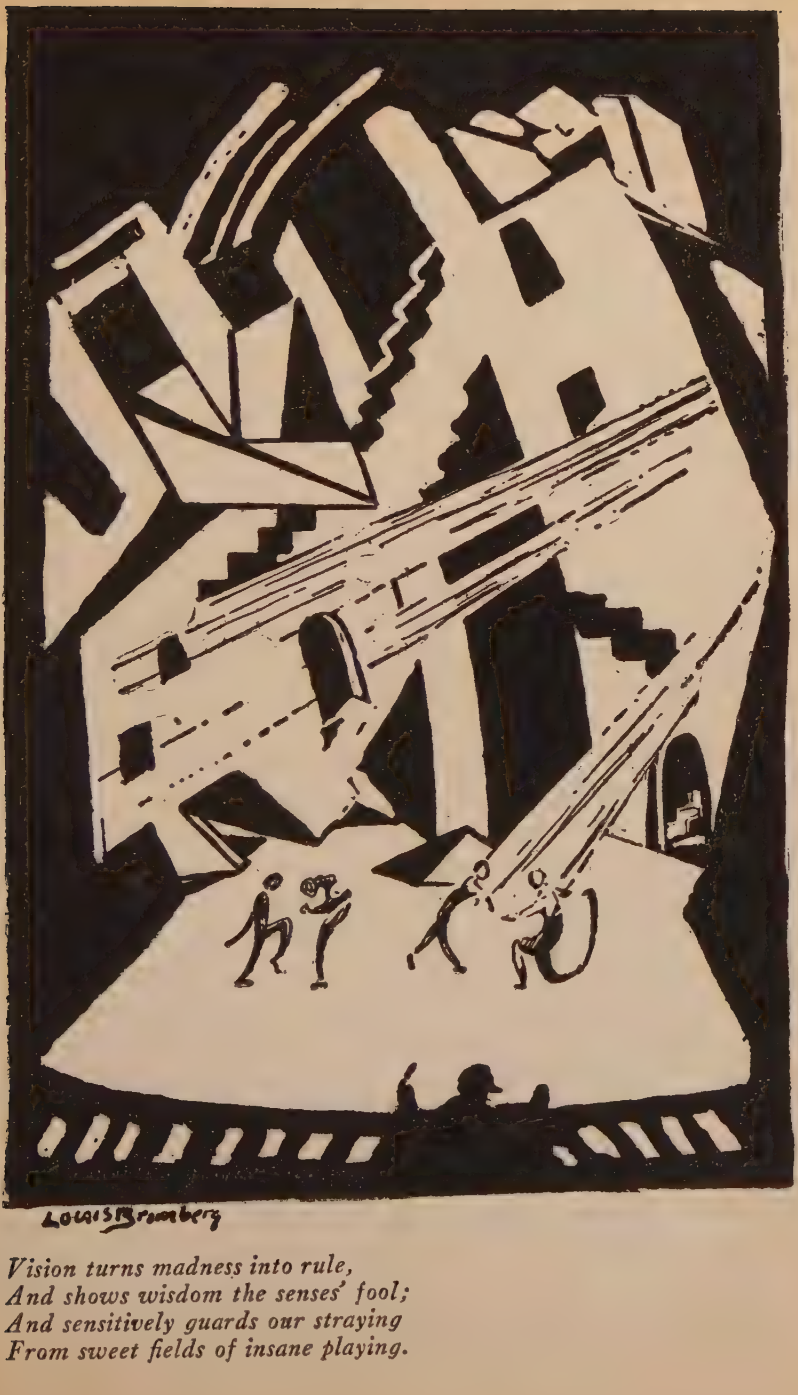
The ferment of the Bolshevik upheaval has shattered the old literary ruts of Russia, and produced a new crop of post-Revolutionary writers, including the fervid poets Alexander Bloc and Vladimir Mayakovsky, and the distinguished story-tellers Ivan Kasatkin, Lydia Seifulina, Vlevolod Ivanov, and S. Semenov. It is too early to judge how these men will stand beside the giants of the preceding century; their promise is akin to the strangely mingled promise of the red proletarian leaders who have so far successfully defied all opposition without and within.

SCANDINAVIAN LITERATURE

The Norsemen or Vikings, the Teutons settling in Scandinavia, were from the start attuned to literary expression. As early as the 13th century Snorri Sturlason collected the folk-tales comprising the younger Edda; not until the 17th century were the older stories of the elder Edda crystallized into collected form. These *sagas* or stories are poems dealing with the adventures of Sigurd (the Norse Siegfried) and his fellow heroes.

Two distinguished Norwegian poets, revolutionary Wergeland and conservative Welhaven, paved the way for the age of Hendrik Ibsen, one of the world's greatest dramatists. Ibsen's earlier poetic dramas, including the titanic *Peer Gynt* and *Brand,* were succeeded by realistic prose plays like that impressive study of hereditary insanity, *Ghosts,* and the stories of awakening feminism, *A Doll's House* and *Hedda Gabler.* Poetic drama, at its height, cannot avoid, in its less impassioned moments, a definite artificiality caused by the unnatural use of poetic speech; for we do not order breakfast in iambic verse, nor close a business deal in a rhymed ballade. Prose drama follows the mounting modulations of actual emotion, and is the truer artistic medium. Ibsen is so far the world's greatest master of prose drama. The realism he made memorable is already giving way to a more adaptable technique, varying from impressionistic symbolism to an increasing boring into the subjective conflicts within the minds of men. These could not have originated, without the bedrock of Ibsen.

Jonas Lie and Kjelland are impressive novelists, and Bjornson both novelist and dramatist; but their flights lie far below those of the greater Norwegian. Garborg and Thomas Krag,


Louis Bromberg

Vision turns madness into rule,
And shows wisdom the senses' fool;
And sensitively guards our straying
From sweet fields of insane playing.

in fiction, are far less than Knut Hamsun, whose *Growth of the Soil* is an epic study of peasant life, handled with the astringent skill of a master.

The literature of Denmark began with Ludwig Holberg, a distinguished satirist, during the early 18th century. The poet Oehlenschläger is hailed by the Danes as their titan, but his influence is largely confined to his own land and its neighbors. More widespread was the renown of Hans Christian Andersen, an exquisite reteller of fairy tales, and an innovator of original ones. The poet Drachman, with his tales of simple folk, earned the leadership of the Danish theatre; Denmark's greatest prose artist, Jens Jacobsen, is little more than a name to the rest of the world. There is no gain in listing names of figures great in their own small land, but a silence elsewhere. Georg Brandes, Denmark's leading critic, has earned the world acclaim that his fellow-countrymen, except Andersen, could not reach. From his aloof pinnacle of Jewish scholarliness he has uttered his *Main Currents in Nineteenth Century Literature,* a magnificent survey of the world's recent achievements in this field.

Such early Swedish writers as the poets Stjernhjelm and Rosenhane are as unknown to the English-speaking world as the later Tegnér, for all the latter's translation by Longfellow. It is a queer commentary on the uncertain rewards that sometimes greet the poet that this writer's *Frithiof's Saga* procured him his elevation to a bishopric. The novels of Frederika Bremer, a Finn, are today little more than sentimental curiosities to us. Runeburg, a Finnish poet, says as little to us, for all his home reputation. Strindberg is one Swedish author whose novels and short stories have powerfully impressed this fringe of the world, though his art is less than that of the great Russians. Selma Lägerlof, delightful fantastic novelist, and Ellen Key, a powerful essayist upon feminist topics, have influenced all modern thought; and the exquisite lyric poetry of Verner von Hendenstam is at present embarked upon the same course.

A word should be said upon Dutch and Flemish literature. The great Dutch theologian, Erasmus, wrote in Latin, as did the philosopher Spinoza. Such distinguished Dutch writers as the 17th century poet Vondel and the modern novelist Louis Couperus do not loom impressively, in English translations. The same is true of the Flemish novelists, Hendrik Conscience and Sleeckx. The creative products of these writers have failed to catch the key of the strivings of the English and American souls; this is merely by way of differentiation, not of gradation by merit. Perhaps in the future these names will achieve a significance they have so far lacked.

ADDITIONAL READINGS

French. The poems of Villon have been excellently translated by John Payne. Other French poetry had just as well be read in a prose translation.

The romances of Hugo, Dumas, and Balzac are easily available. Important French novels that should be read are:

Madame Bovary, by Gustave Flaubert.
Mademoiselle de Maupin, by Theophile Gautier.
Penguin Island, The Revolt of the Angels, At the Sign of the Reine Pedauque, The Crime of Sylvestre Bonnard, The Red Lily, and *Thais,* by Anatole France.
Under Fire and *Light,* by Henri Barbusse.
Jean Christophe, by Romain Rolland.
The Death of a Nobody, by Jules Romaines.

Italian. Adequate prose translations of Dante are easily available. Boccaccio's *Decameron* is always readable. Casanova's *Memoirs,* in part at least, may be read with great pleasure.

Spanish. The *Don Quixote* of Cervantes is dull, but should be read in all portions found interesting. Ibanez's *The Shadow of the Cathedral, The Cabin,* and *Woman Triumphant,* are well worth reading.

German. Goethe, Schiller, and Heine are available in adequate prose translations. Hauptmann's *The Weavers* and Molnar's *Liliom* are the most impressive plays in translation. Wassermann's *The World's Illusion* and *The Goose Man* have received excellent translation.

Russian. Russian poetry has not yet been well translated into English. Turgueniev's *Fathers and Sons* and *Asia,* Dostoievsky's *Crime and Punishment, The Idiot,* and *Brothers Karamazov,* Goncharov's *Oblomov,* Artzybashev's *Sanine,* and the anthology of post-Revolutionary stories, *Flying Ossip,* give the best of Russian fiction.

Scandinavian. The plays of Ibsen are available in adequate prose translation. Hamsun's *Growth of the Soil* is the outstanding Scandinavian novel available in English.

IV. ENGLISH LITERATURE

ITS THREEFOLD ANCESTRY

Three chief races blended to form the English people, and its speech and literature. First came the Celts, pushed westward by the blond Teutonic flood until mere remnants clung for life to the sea-walls of Ireland, Wales, and Scotland. Over these the heavy-footed Angles and Saxons strode; to yield in turn to their more polished kinsmen, the Normans, and to find resurrection again in the ultimate flowering of things English. Each of these three races came to the blending with rich early gifts of song.

The Celt, a fellow of infinite jest and wonder, an amalgam of quick tears and quicker laughter, was foaled in fairyland. He was swift to fall to his knees before a dewdrop on a clover leaf, and dull at seeing the sweep of a forest or a hill-mounting horizon. He gave England her first national hero, dim Arthur out of misty Camelot. He gave England ecstasy. After him trod a somber blend of red-handed Macbeth and sour Malvolio, the Anglo-Saxon. The Celt gambolled in fantasy; the Anglo-Saxon reasoned, bowed by the weight of young burdens labelled Right and Wrong, and by the heavy bludgeonings of fate. From gloomy gray sea and shrouded dank fenland he drew his view of life: a morbid exultation, a massive and abiding fear. His gift was contemplation—heavy-footed, logical, often despairing. Last came his cousin, the roystering gallant Norman, with gay song on his lips and ritual of satiny courtesy on his tongue. He gave England gusto, zest. The three of them are England and things English.

From the start, the Celtic song sparkled with keen sight of Nature—a quality lacking in most literature. This early Welsh fragment gives the mood:

Rain without, and the fern is drenched;
White is the gravel of the sea;
There is spray on the margin.

The Celtic literature was centered about three back-broken epics, the tales of the half-gods the Tuatha-De-Danaan; the cycles of the legendary kings Conchobar and Cuchullin; and the stories of Finn and Oscar and the poet-warrior Ossian. These in turn were replaced by Arthur, in popular esteem. The Anglo-Saxon literature was rooted in the raw old epic *Beowulf,* evidently composed on the continent. This is the story of the young king who came with his thanes to rid the palace and lands of the aged Danish ruler Hrothgar of the harsh monster Grendel; and how Beowulf won this fight, in his youth, and in his old age went hopelessly into conflict with a fire-drake, or dragon, which he killed as he himself was dying. The poetic devices in Anglo-Saxon poetry, as we have seen, included alliteration in each line, and a break midway:

> Then we together   on the tide tarrying
> Five nights forth fared;   by floods hurled apart;
> The waves weltering;   weather the coldest,
> With darkening night   and northern wind,
> Battle-grim billows,   rough-crashing breakers.

Such is the storm and stress in which the old epic moves. The 7th century poetry of Caedmon, based on Old Testament narratives, and the 8th century poetry of Cynewulf, based upon gentler New Testament sources and materials from the early historical legends of the church, were composed by the alien Teutons in England. This, and some Anglo-Saxon prose written under the patronage of the Wessex king Alfred, constitutes the impressive Anglo-Saxon contribution to English literature.

Norman literature was far from the sober gloom of the earlier Teuton conquerors of the island. The sparkling *Song of Roland* first received definitive shaping in England. Yet the final conquest went to the submerged Anglo-Saxon speech, mellowed by Norman influences, rather than to the Norman-French of the last group of conquerors.

CHAUCER AND THE RENAISSANCE IN ENGLAND

In the Latin history of the twelfth century Anglo-Norman, Geoffrey of Monmouth, we meet for the first time the developed Arthurian legend. The English priest Layamon, early in the 13th century, gave it its fullest form, this being in the young English tongue; and, after travelling throughout Europe, it returned at the end of the 15th century, to receive concise epic treatment at the hands of Sir Thomas Malory. The pagan excesses had given way to a high idealism of Christian ascetic knighthood, and the finished product embodies the highest expression of the medieval spirit outside of Dante.

Geoffrey's book, *A History of the Kings of Britain,* written in Latin, contained, in addition to the Arthurian tales, the stories of Lear, Cymbeline, and other half-legendary rulers. This remained for centuries the wellspring of English tales—the centuries during which the language of the submerged Anglo-Saxons was growing into the English of the whole people. Among the products of this transition period are the *Ormulum,* a group of religious statements by the half-mythical monk Orm, and the *Ancren Riwle* (Anchorites' Rule), a severe book of instructions for young nuns. Most impressive of all were the dawn-hour lyrics that meant the awakening of English song. Loveliest of these is the one with the refrain,

> Blow, northerne wynd,
> Send thou me my sweeting.
> Blow, northerne wynd,
> Blow, blow, blow.

These were the fit prelude to Chaucer's vaster dawn song.

Geoffry Chaucer's life stretched between 1340 and 1400. Son of a vintner or wine-merchant, the youth became page to the son of Edward III; dependent of John of Gaunt; warrior in France; and the recipient of many marks of royal favor. In his youth, Chaucer translated the popular French *Romaunt of the Rose.* During his Italian wanderings, when he may have met Boccaccio and Petrarch, Chaucer wrote his *Troilus and Cressida,* a brisk retelling of a tale of Boccaccio's, with sharply etched character drawing. The same period saw *The Parlement of Fowles* and *The Legends of Good Women,* an unfinished series of tales; and the lofty

The House of Fame. These were the needful preparations for his greatest work, *The Canterbury Tales,* a magnificent unfinished torso of medieval stories. These stories, told by pilgrims stopping at the Tabard Inn, at Southwark, London, on their way to the shrine of murdered Thomas à Becket at Canterbury, ripple forward in leisurely fashion, ranging from the exquisite Knight's Tale of the amorous brothers Palamon and Arcite, down to coarse country comedy and dainty fables. Chaucer's strength lay primarily in his ability to tell a story well; a secondary achievement was that he made the English language as tripping and light as the French. His 5-foot iambic rhymed couplets profoundly influenced the later adoption of the 5-foot line as the standard of English verse.

In prose, we have the fantastic travels of the imaginary Sir John Mandeville, Knight, translated from the French into English. Chaucer's contemporary John Gower had every quality of the master except genius; the *Confessio Amantis* is his best known work. There was also a revival of alliterative Anglo-Saxon verse, under the leadership of William Langland, author of *The Vision of William Concerning Piers the Ploughman.* Langland was a typical Anglo-Saxon, stern, vehement, moralizing; his sober pilgrims in search of truth differ vastly from Chaucer's gay company. This was the last serious effort of Anglo-Saxon verse to dominate English literature; with Chaucer, the current set definitely in favor of the Gallicized model.

The same century also gave England John Wyclif's translation of the Bible into the common tongue, and the beginning of the religious miracle and morality plays, which paved the way for the wide expanse of Elizabethan drama. Scotch literature awoke, in vigorous singers; and the great series of English folk ballads began to be chanted throughout the countryside, lifting forever into English hearts the folk hero Robin Hood, thief from the rich and benefactor of the poor. The Renaissance of classic learning, the discoveries of America, the Reformation, and Caxton's printing press, set up in London between 1470 and 1480, were followed by Sir Thomas More, a noble English dreamer, whose *Utopia* (or, Nowhere), the picture of an ideal commonwealth, is still read with interest.

Then Sir Thomas Wyatt borrowed the sonnet from Italy, and Henry Howard, Earl of Surrey, acclimatized heroic blank verse (unrhymed lines of five iambic feet) into English, probably deriving it from the same source. Wyatt, lover of Anne Boleyn, ambassador to Rome, escaping captive from a Spanish jail, inmate of the Tower of London for treason, dying of a fever incurred in royal charge; Surrey, a tourneying blade, chancellor of the Duchy of Lancaster, field-marshal in Flanders, duelist, window-breaker, Lent-breaker, beheaded at last on Tower Hill on some flimsy charge—these were typical gallants, with Norman quicksilver in their veins. These two were significant to literature less for their actual achievements, than for the fact that they gave to English poetry two of its most important tools.

Sir Philip Sidney's noble sonnets, John Lyly's affected *Euphues,* full of dull conceits, and the essays and ponderous writings of Sir Francis Bacon, seem light indeed beside the beauty of Elizabethan lyrics, in the hands of such masters as Thomas Campion and the dramatists. The sonnet received noblest development in the extended sonnet cycles of Spenser and Shakespeare. Edmund Spenser is best known for his immense allegory of chivalry, *The Faerie Queene.* To modern readers, the adventures of Prince Arthur (a thin disguise for heroic King Arthur) in search of the beautiful fairy queen Gloriana (a character whom Elizabeth took to be a picture of herself) are a bit dull and tarnished. Spenser is ranked by some critics among the leading English poets, and many of his lines undoubtedly ring with a deep music; but the theme has grown archaic, and the hectic present finds that he has little to say to it. The Spenserian stanza in which it is written (rhyme scheme a, b, a, b, b, c, b, c, c, with eight 5-foot iambic lines followed by an Alexandrine, or 6-foot iambic line) has been much imitated; barring the later American development, the *Canopus* stanza, which does not end on a rhymed couplet, it is the English stanza best fitted for narrative verse.

SHAKESPEARE AND MILTON

It is in the drama that the age of Elizabeth soars highest. Even before her time, rude early comedies, like *Ralph Roister Doister* and *Gammer Gurton's Needle,* awoke the applause of an audience prepared by a flood of miracle and morality plays and interludes. Early tragedy ranged from the frigid classical *Gorbudoc* to Kyd's wild *Spanish Tragedy.* Greatest of the predecessors of Shakespeare was Christopher Marlowe, master of noble blank verse, as in his *Tamburlaine, The Jew of Malta,* and *Doctor Faustus,* with its immortal invocation to Helen of Troy:

> Was this the face that launched a thousand ships,
> And burnt the topless towers of Illium?
> Sweet Helen, make me immortal with a kiss!

Then came William Shakespeare. There is a strange incongruity between the little we are told of his drab stingy life, and the soaring glory of his product. The little reported of his life is oddly broken by significant gaps. Born in Stratford-on-Avon in 1564, we find him making his way to London; and by 1592 he was known as a dramatist. Two splendid early poems appeared, *Venus and Adonis* and *The Rape of Lucrece,* both dedicated to Henry Wriothesley, Earl of Southampton. After a long delay the *Sonnets,* many of them written long before, were published in 1609. Some of these reach a high poetic music; and the form in which they are cased is named the Shakespearean sonnet. The rhyme scheme differs from the Italian or Petrarchan sonnet, which we have considered; it consists of three quatrains or 4-line stanzas, rhymed alternately (as a, b, a, b), followed by a rhyming couplet. The whole rhyme scheme then would be: a, b, a, b; c, d, c, d; e, f, e, f; g, g. An example, one of the noblest in the series, will indicate more fully the mechanism of rhyme and rhythm, and will serve as a model:

> When, in disgrace with fortune and men's eyes,
>   I all alone beweep my outcast state,
> And trouble deaf heaven with my bootless cries,
>   And look upon myself and curse my fate,
> Wishing me like to one more rich in hope,

Featur'd like him, like him with friends possess'd.
Desiring this man's art and that man's scope,
With what I most enjoy contented least;
Yet in these thoughts myself almost despising,
Haply I think on thee, and then my state,
Like to the lark at break of day arising
From sullen earth, sings hymns at heaven's gate:
For thy sweet love remember'd such wealth brings
That then I scorn to change my state with kings.

The plays fall into definite groups. The first period, chiefly of adaptation of the plays of others, includes such superficial comedies as *The Two Gentlemen of Verona* and *Comedy of Errors,* with the brutal tragedy *Titus Andronicus* and certain dull historical plays. The second period marked a maturing into sunny serene comedies like *The Taming of the Shrew, A Midsummer Night's Dream,* and *Twelfth Night,* together with the impassioned tragedy of youthful love, *Romeo and Juliet,* and the brilliant histories *Henry V,* surcharged with patriotic love of England, and the two parts of *Henry IV,* containing the immortal comic character Falstaff, that rollicking fat knight. Then a vast shadow overspread the work, marked with bitter tragi-comedies, and opening into the great tragedies *Hamlet, Othello, Lear, Macbeth,* and the tragedies too unreservedly bitter to be great, *Coriolanus* and *Timon of Athens.* No tragedies but the works of the three Greek masters can compare with these; they probably include the world's highest tragic utterances. This mood of dreadful failure was succeeded by the comparative disillusioned calm of *The Tempest, Winter's Tale,* and *Pericles:* and the roll is done.

The sources may usually be traced to Plutarch's *Lives,* Holinshed's *Chronicles,* or some continental storehouse of plots like the *Decameron.* The verse measure is predominantly heroic blank or unrhymed verse, already described; ranging from the early frequent use of rhyme tags and of end-stopped lines like:

Friends, Romans, countrymen, lend me your ears.
I come to bury Caesar, not to praise him.
The evil that men do lives after them,
The good is oft interred with their bones,

in *Julius Caesar,* to the freer rhythm and carry-on lines like the music of *Macbeth:*

> Out, out, brief candle!
> Life's but a walking shadow, a poor player
> That struts and frets his hour upon the stage,
> And then is heard no more; it is a tale
> Told by an idiot, full of sound and fury,
> Signifying nothing.

The plots, for all their diversification superficially, are simple in essence. The great tragedies hang each upon a single powerful human emotion. *Othello* is the jealousy of a dull-witted man, *Macbeth* the conscience's punishment of boundless ambition, *Lear* the breakdown of too-trustful senility, *Hamlet* the curse of indecisiveness. The characters live forever in English hearts: vast-bellied Falstaff, roaring Bottom, ranting Petruchio and his quickwitted Catherine, hate-ridden Shylock, eloquent Mark Antony, brave Prince Hal—the list could cover pages. What Shakespeare touched, he transmuted to poetry.

All but his life, which, for all his touch, sags down to drab mediocre prose. Several recent scholars insist that the magnificent product could not have been the work of an illiterate Stratford actor and petty business man. With weak reasoning some have sought to locate Francis Bacon as the author; with far more cogent logic J. Thomas Looney and others have identified the real author as Edward de Vere, 17th Earl of Oxford, and a member of what Macaulay calls the noblest house that ever dwelt in England. The surviving poems of de Vere (who bested Sir Philip Sidney in his youth repeatedly, and was hailed as the chief court poet) are strangely like young experiments of the genius that blossomed in Shakespeare. The few contemporary records that laud Shakespeare call de Vere "the best for comedy" in his day, and "best of the courtier poets" of the early days of Elizabeth. The sonnets, and indeed the plays, tell de Vere's story, and not the Stratford actor's. The case identifying the nobleman with the author of the plays can only be grasped in its entirety from Looney's treatise. Perhaps future discoveries will settle for all time the vexing problem.

Greater in influence than in achievement was "rare Ben Jonson," a learned classicist, whose witty plays are dull on today's stage. Thomas Dekker, the gifted pair of collaborators, Francis Beaumont and John Fletcher, in comedy, and John Webster and John Ford for appalling tragedies almost comparable with Shakespeare's best, would have shone in any age but Shakespeare's; but the moon pales with the sun near. Among the lyricisits the intricate John Donne, and the lighthearted Caroline poets (from Carolus, Latin name of the Stuart king Charles) Suckling, Lovelace, Carew, and Herrick, are memorable. In prose, the age saw Isaac Walton's *Compleat Angler,* a leisurely masterpiece; the melodious prose of Sir Thomas Browne's *Urn Burial,* and the magnificent flow of the King James version of the Bible. An amazing masterpiece is the anonymous *Tom-a-Bedlam's Song,* by a madhouse graduate, containing poetry as exquisite as:

With an host of furious fancies,
Whereof I am commander,
    With a burning spear
    And a horse of air
To the wilderness I wander;
By a knight of ghosts and shadows
I summoned am to tourney
    Ten leagues beyond
    The wide world's end—
Methinks it is no journey.

It is no wonder that this strange burst of poetry, from just across the borderline separating genius from madness, should have profoundly affected generations of later writers.

Then cavalier England gave way to Puritan England; Norman joy fell before Anglo-Saxon gloom; and John Milton, embodying the whole transition in his writings, lifted his blind face toward the stars. As a staid cultured youth, he wrote bright pastorals, *L'Allegro, Il Penseroso,* and the elegy, or poem commemorating death, *Lycidas.* The first two of these are pure classic Renaissance; *Lycidas* sees the Right-blindered Puritan interrupting the exquisite song. Milton sacrificed his eyes translating Latin manuscripts for Cromwell's Puritan government, and writing voluminous pamphlets in favor of divorce and free speech, and against kings. His splendid sonnets in the Italian form were followed by *Paradise Lost,* England's epic.

Its chief figure is neither Adam nor the Messiah, but Lucifer, the fallen "son of the morning," the long discredited Christian devil. The splendor of the lines, in the grand manner, is impressive; but they have a coldness less of Puritan life than of death. Even less successful are his two closing poems, the austere *Paradise Regained* and the frigid Greek tragedy *Samson Agonistes,* in which the eyeless poet pictures himself in the person of triumphant blind old Samson. The decline of the significance of Milton is not hard to understand. The ethical problems that troubled him have ceased to bother his descendants; the poetry is largely dead to us. The epic at best is a made epic, like Virgil's; it lacks the spontaneity of a natural epic. In spite of a general tendency to rank Milton as England's second poet, it is probable that future criticism will see his ranking slip quietly down the scale, to be replaced by fresher singing voices.

THE CLASSICISTS

The Puritan period was marked by one amazing bit of folk literature, *Pilgrim's Progress,* by John Bunyan, a tinker of Elstow jailed for his religious beliefs. The reaction against Puritanism appeared early in Samuel Butler's satirical mock-epic, *Hudibras,* which is even more lifeless today than the works of the great Puritan poet. And then a great poet-critic, John Dryden, lifted himself to the place of literary dictator of England, and the age of the literary tyrants was at hand. Dryden was one of the most flawless and biting of all writers of verse in English. With becoming lack of meekness, he rewrote "crude" Shakespeare, to please his tasteless audiences. Dryden flung himself furiously into the political and religious controversies of the day, many of his more bitter poems being mere pamphlets in verse. When the crown changed from Anglican Protestant to Roman Catholic, Dryden obligingly shifted his religion, and defended the new as shrewdly as he had extolled the old. In spite of his flashes of pure poetry and his immense vigor, he is cold and dead compared with poets who let the heart of man speak freely and sincerely. His work is chiselled marble, rather than the living tree.

The sickly little wasp, Alexander Pope, succeeded Dryden as literary dictator. His rhymed iambic 5-foot couplets are the most perfectly polished verse in the history of English literature; he had all of a pope's infallibility in technique. The trifling mock-epic, *The Rape of the Lock,* is not nearly so lively today as the biting satire *The Dunciad,* or the exquisite moralistic verses, *Essay on Man.* No author except Shakespeare has written so many memorable lines:

> True wit is nature to advantage dress'd;
> What oft was thought, but ne'er so well express'd. . . .
>
> To err is human, to forgive divine. . . .
>
> For fools rush in where angels fear to tread. . . .
>
> Know then thyself, presume not God to scan;
> The proper study of mankind is man. . . .
>
> Authors, like coins, grow dear as they grow old;
> It is the rust we value, not the gold.

The quotations might be endlessly multiplied. The high idealism that marks the noblest poetry has been replaced by faceted jewels of criticism and cynicism. The product is great, but it is never poetry of the first flight.

The drama, since the Puritan and Restoration periods, had sunk further and further into a decay of witless grossness. Man's spirit, grieving under the abuses of the time, found wide utterance in Jonathan Swift, an Irishman; one of the justifications of the Irish witticism, that the greatest English writers are all Irish. Swift's mammoth satire of the human race, *Gulliver's Travels,* was written for adult consumption, not for the nursery. The passing years have made its harshest satire quaint and somehow gentle. Joseph Addison and Richard Steele wrote leisurely essays on English themes, rural and urban, which slowly decline in popular esteem. The orator Burke, the historian Gibbon, achieved well in their more utilitarian fields: and then the novel awoke, in the person of Samuel Richardson.

Its accidental origin was in an order to Richardson to write a *Polite Letter Writer,* a manual of social correspondence. Richardson threw his letters into the form of a continuing story, and the novel *Pamela, or Virtue Rewarded,* was the result. Greatest of his novels was *Clarissa Harlowe,* a tale of virtuous maidenhood harried by masculine lust, ending in the sufferings and extremely deliberate dying of the model of maidenly denial. A greater novelist was Henry Fielding, where *Joseph Andrews* was commenced as a parody or burlesque of Richardson's *Pamela.* Most successful of all Fielding's stories is *Tom Jones,* as delicate as a bartender's wit, yet wisely and vigorously human. Fielding was a realist, where Richardson was a sentimentalist; and his realism is read today chiefly for its frank slapstick vulgarity. The novels of Tobias George Smollett and Laurence Sterne also achieved wide popularity. All of these earlier stories move with a staid circumlocution which is annoying to the reader in this rushed modern hour.

The last of the great literary dictators was the diseased Latinist Samuel Johnson, author of the first *English Dictionary.* He is more famed as a personality than as a writer; his cumbrous Latinized early style is almost unreadable. Yet his sturdy old spirit, as displayed, for instance, in his bitter letter to a lukewarm patron, makes him oddly lovable. John Gay is most noted for his jolly *Beggar's Opera;* Crabbe, for lumbering poems of English village life. Oliver Goldsmith earns mention for a single slight novel, *The Vicar of Wakefield,* and for a rollicking comedy, *She Stoops to Conquer*—the most amusing play since Shakespeare. It and its two compeers, *The School for Scandal* and *The Rivals,* by the Irish wit Richard Brinsley Sheridan, are the chief drama worthy of praise between Ben Jonson and the age of Wilde and Shaw.

THE ROMANTIC REVIVAL

All of this, except for the realism of Fielding, Daniel Defoe (author of *Robinson Crusoe*), and a few other novelists, had divorced literature from the actual utterance of the human heart. Gentle James Thomson and William Collins, and lethargic Thomas Gray, author of the loved *Elegy in a Country Churchyard,* hardly departed from the worship of the cold classicists. Yet in the publication of Bishop Percy's *Reliques* of *Ancient English Poetry,* reviving the folk ballads, and of Scotch James Macpherson's half-forged Celtic epic of *Ossian,* the seeds for a new spirit were sown.

These came to fruitage first in the songs of Robert Burns and William Blake. Burns, a Scotch ploughman, is one of the great poets of the language, with his universal heart-cries and poignant songs. For sheer humor, his *Tam o' Shanter* is unsurpassed; the rousing patriotism of *Scots Wha Hae wi' Wallace Bled;* the tender lyrics *To a Mouse* and *To a Mountain Daisy;* the magical songs, *O My Luve's Like a Red Red Rose, Auld Lang Syne, Ae Fond Kiss,* and the rest—these are bright new stars in the poetical heavens. The satirist Burns is not so well known:

A fig for those by law protected!
  Liberty's a glorious feast!
Courts for cowards were erected,
  Churches built to please the priest.

Tremendous vigor, a clear singing tone, harsh social criticism—and yet, like a belated Villon, the man Burns came to grief, and died young.

Blake, as a boy, saw trees full of angels; he never lost this childlike vision. His *Songs of Innocence* and *Songs of Experience* are far more loved and known than his wilder semi-poetic rhapsodies, or his magnificent drawings. Like Burns, he throbbed with the rising mood of democracy:

I will not cease from mental fight,
Nor shall my sword sleep in my hand,
Till we have built Jerusalem
In England's green and pleasant land.

Then came the French Revolution, and the sunburst of English singing. William Wordsworth was the first of the major singers to lift his voice. In *Ode on the Intimations of Immortality* and in many of his sonnets and short lyrics, he is a superb songster; but his interest for today is injured by his uncritical inclusion of many verses so harsh and barbaric that they would disgrace a high school student. The strange genius Samuel Taylor Coleridge, Wordsworth's friend for many years, earns higher rank as a poet, by virtue of one great romantic ballad, *The Rime of the Ancient Mariner*, and two fragments, *Christabel* and *Kubla Khan.* The foreword to *Christabel* is pungent poetic criticism—Coleridge was outstanding as a literary critic; it appealed for a rhythm based, not on a definite succession of identical feet, but on a given number of accents to the line, with any number and arrangement of unaccented syllables. Poets today have carried this liberal mechanism into practice, with exquisite results. The *Ancient Mariner* is a hauntingly magical poem; but the half-mad *Kubla Khan* is throughout in that rhapsodic super-sanity which makes the Tom-a-Bedlam song memorable, as in the great lines by Coleridge:

> A savage place! as holy and enchanted
> As e'er beneath a waning moon was haunted
> By woman wailing for her demon lover! . . .
>   Weave a circle round him thrice,
> And close your eyes with holy dread,
> For he on honey-dew hath fed,
>   And drunk the milk of Paradise.

Both Coleridge and Wordsworth, at first attracted to the cause of the French Revolution, reacted from the excesses of the Reign of Terror. George Gordon, Lord Byron, England's and Europe's disgraced club-footed darling, kept his love of idealistic liberty to the end. A minor member of the British aristocracy, his wild tales, especially of Oriental life, first earned him popularity. Greater than these are the autobiographic *Childe Harold* and *Don Juan*, where bits of exquisite poetry gem a vast framework of witty light verse. Many of Byron's lesser lyrics are exquisite; but his prevailing quality is dash and energy, rather than the hearing and repeating of the high lyric note heard from the still small voice within, and trumpeted over the world in the poet's stanzas. Byron's personal life, his desertion of his wife, the alleged incest with his sister, his liaison with the half-sister of Shelley's second wife, and his Italian dissipations, earned him disgrace and banishment from England. He died in a futile gesture, fighting for the tardy freedom of the modern dregs of Grecian greatness.

Far nobler as a poet was Percy Bysshe Shelley, son of a stiff-necked English baronet, and himself a youth-minded zealot for liberty. Expelled from Oxford for a crude shallow pamphlet defending atheism, he married through the machinations of his first wife's family, and deserted this wife to elope to the continent with Mary Godwin, daughter of an impoverished idealist who continually leeched himself financially on young Shelley. Shelley in his poetry defended incest between brother and sister, as Byron did; but his amorousness was spiritual, and his successive admirations for various women were remote from the physical. Drowned in the lovely Italian bay of Spezia at the age of thirty, he left an imposing monument of song behind him. Greater than his narratives and semi-Shakespearean dramas are his exquisite songs, his noble Greek drama *Prometheus Unbound,* and the highest of all, the autobiographic *Ode to the West Wind.* Such lyrics as *The Indian Serenade* (I arise from dreams of thee), *Love's Philosophy, To Night,* and this haunting song,

Music, when soft voices die,
Vibrates in the memory;
Odors, when sweet violets sicken,
Live within the sense they quicken.

Rose leaves, when the rose is dead,
Are heaped for the beloved's bed;
And so thy thoughts, when thou art gone,
Love itself shall slumber on,

show his mastery of music. Not since the high days of Campion had such music been heard in English. Shelley's vitriolic political poems are long forgotten; these heart-cries are his winged epitaph.

Greatest of all the Romantics was John Keats. His father was a stable-owner; the sturdy son, only five feet high at maturity, studied to be a surgeon, and received an apothecary's license. His lack of height prevented women from taking his proffered love seriously; and when Fannie Brawne at last reciprocated, Keats was too ill of tuberculosis to learn the golden emptiness that sated love brings. He died at the age of twenty-six from the ravages of the disease, and is buried in Italy.

The poetry of John Keats is as incomplete as his brief life was; yet, in the eyes of many, he stands beside Shakespeare and Browning, as one of the three greatest English poets. That colorful narrative, *The Eve of St. Agnes;* the more magical fragment, *The Eve of St. Mark;* the faintly perfect ballad, *La Belle Dame Sans Merci;* the odes *To Autumn, On a Grecian Urn, To a Nightingale,* the sonnets and bright songs, near the perfection of English verse. Highest of all is the torso *Hyperion,* an epic fragment in which the Miltonic style becomes, not eloquence, but poetry. Keats was great enough to achieve such magic as

No stir of air was there,
Not so much life as on a summer's day
Robs not one light seed from the feather'd grass,
But where the dead leaf fell, there did it rest.

The word-usage in this passage is significant, with all one-syllabled words except two, and these simple Teutonic dissyllables—the height of chaste monosyllabic Anglo-Saxon speech. How vigorously the youth of twenty-five commanded,

Be thou therefore in the van
Of circumstance; yea, seize the arrow's barb
Before the tense string murmur.

This poet prostrated himself before his own fantasy of beauty, sprung out of his own body's incompletion:

A thing of beauty is a joy forever. . . .

For 'tis the eternal law
That first in beauty should be first in might. . . .

One other line must be repeated:

Knowledge enormous makes a god of me.

Beside Shakespeare and Browning. . . . Beside Shakespeare . . . Perhaps, in pure poetic stature, taller by a trifle.

Sir Walter Scott achieved wide fame as a writer of brisk border tales in verse, and of spirited novels, *Ivanhoe, Kenilworth, Quentin Durward,* and twenty-six more. These were all stories of plot and action, and, for all their juvenile popularity, are not high literature. Jane Austen's quiet stories please more profoundly; and the essays of gentle Charles Lamb and drug-fired Thomas de Quincey, and the keen criticism of William Hazlitt, make the period distinguished.

Wider even than Scott in popular appeal was Charles Dickens, perpetual immortalizer of the lovably odd and eccentric in English life, with a slight excess of caricature and sentimentality. The rollicking *Pickwick Papers,* the bookish *Tale of Two Cities,* the popular *David Copperfield,* are only three of his many masterpieces in the second flight of novel writing. William Makepeace Thackeray, with his vibrant satire in *Vanity Fair,* and his unforgettable acidy etchings of English snobility in half a dozen other splendid novels, appeals more to the mature mind. George Eliot, by her method, lifted herself highest of the group. For she wrote from within, subjectively as opposed to objectively; she pictured the minds, or spiritual natures, of men and women, rather than their external garb of action. The flawless idyll *Silas Marner,* the rustic beauty of *The Mill on the Floss* and *Adam Bede,* show her at her best; her final bookish stories, *Romola* and the others, are not quite as great.

Gentle Anthony Trollope and vigorous Charles Reade must be mentioned, as well as two greater writers, Max Beerbohm and Leonard Merrick. Beerbohm's *Zuleika Dobson* is the height of the sophisticated farce in English; Merrick's *Conrad in Quest of His Youth* is only the best among a score of the most finished, if not the most significant, of recent English novels. Robert Louis Stevenson, a physical weakling, wrote resounding adventure stories in *Treasure Island* and *The Master of Ballantrae,* and a popular handling of a striking psychological situation in *Dr. Jekyll and Mr. Hyde.* Thomas Hardy is greatest for his realistic *Tess of the D'Urbervilles;* his heavy poetic *The Dynasts* does not quite convince, and his sharp lyrics are less than those of many other living poets. George Moore is praised for his flowing Irish style; George Meredith, in many keen psychologic novels, pleased many. The three Brontë sisters, especially in *Wuthering Heights* and *Jane Eyre,* wrote brilliantly and with fidelity to subjective truth. A novelist who died recently, Joseph Conrad, a Pole writing in English, achieved memorable sea tales, and some, like *The Nigger of the Narcissus,* above criticism. Many critics hail him as a master; to me, he seems ponderously less than this.

Living England has a magnificent group of novelists. H. G. Wells, in his earlier days, wrote a fine group of middle-class studies, *Mr. Polly, Love and Mr. Lewisham,* and the rest. Arnold Bennett dealt almost as well with the same group in *Old Wives' Tale* and other stories of the Five Towns; while John Galsworthy, in his tremendous *Forsyte Saga,* the story of generation after generation of Forsytes, is greatest of the three. D. H. Lawrence's magnificent *Sons and Lovers* was succeeded by lesser and more hectic work; Gilbert Cannan's *Three Sons and a Mother,* the finest fictional treatment of the hour of the dawning of the factory-system in England, marked the crest of an author whose later works declined more and more. Fryniwyd Tennyson Jesse's *Secret Bread,* Frank Swinnerton's *Nocturne,* W. L. George's realistic *A Bed of Roses,* come only slightly behind the greater work of Samuel Butler and Sheila Kaye-Smith. Butler's *Erewhon* is a glorious gallimaufry of rattling adventure prose and sharp social satire; his *The Way of All Flesh,* appearing posthumously, is often called the greatest novel ever written in English. Its nearest rival is *The End of the House of Alard,* a story of the death of English squireocracy after the World War, by Miss Kaye-Smith. Her story of the sturdy peasant woman *Joanna Godden* is almost as important. Lesser, yet worthy of high mention, are Hugh Walpole's *The Old Ladies,* Somerset Maugham's *Of Human Bondage,* and W. B. Maxwell's *The Devil's Garden.*

The English short story has lagged behind the French, Russian, and American. But the finer of the mystic stories of Algernon Blackwood throb with interest; and the haunting experiments of Katherine Mansfield suggest the height of art. English experimentation in the field of fiction includes the strange second-by-second chronicles of Dorothy Richardson, the half-successful stories of altering growing psychology of May Sinclair, and the work of James Joyce. Joyce's *Portrait of the Artist as a Young Man* is a provocative thing; his mammoth *Ulysses,* a half mad product, is great as a mine for future novelists, and as a lesson in potential technique and expansion of the possible themes of fiction. As literary art, it is no greater than a telephone directory.

So much for the Romantic poets, and the novelists down to the present. The superficially brilliant essaying Thomas Babington Macaulay, and the vast grotesque sincerity of Thomas Carlyle, must not be omitted. Carlyle's *Sartor Resartus* and *The French Revolution* are tremendous flounderings. The gentle esthetic reformer John Ruskin, and the frigid Matthew Arnold, are of less importance.

In poetry, the Victorian and the present Georgian ages were most noteworthy. Alfred Tennyson is almost great in many fields, and reached a few serene heights in some of his lyrics. His *Idylls of the King,* a late retelling of the Arthurian cycle, is too artificial and misty to be effective, except for high school reading; certain parts of his *In Memoriam* link him with the modern scientific age. Dante Gabriel Rossetti and William Morris, of the pre-Raphaelite school, achieved excellent artificial ballads and sagas; while Algernon Charles Swinburne, master of all the art of poetry, fell below the clouds only by virtue of his tiresome music and his lack of clear thought.

Robert Browning was a giant, where these were merely tall men. He allowed his verse to rock with the coarsest dissonances, when he pleased; his tremendous vigor pulsed through a lifetime's poetry. His superb dramatic monologs, *Saul, Caliban upon Setebos, My Last Duchess,* and countless more, and his gigantic *The Ring and the Book,* with one simple story told by twelve sharply differing personalities, mark his heights. The sentimental poems and witty comedies of Oscar Wilde are still enjoyable; and, in the sophisticated field of light verse, Charles Stuart Calverly, Lewis Carroll, and the inimitable W. S. Gilbert of the *Bab Ballads* and the Gilbert light operas, are unforgettable. The poet of the wide reaches of the empire was Rudyard Kipling, noted alike for his shapely short stories; but Kipling was essentially superficial and eloquent rather than really poetic.

Georgian poetry, that of the present, was ushered in by the exquisite lyrics of A. E. Housman, whose *Shropshire Lad* and *Last Poems* wring with all the poignancy of a sophisticated youth of nineteen. For sheer magic of phrase and rhythm, Walter de la Mare is greatest; his *The Listeners* is one of the rhythmic triumphs of the language. Ralph Hodgson's slender beauty, John Masefield's tremendous sea narratives and searching sonnets, are among the crowns of the period. T. S. Eliot's shammed insanity, in *The Waste Land,* is one of its odd crimes; his satire work is more effective.

Preeminent among living English singers is G. K. Chesterton, whose *The Ballad of the White Horse,* a tale of Alfred, is superb throughout, and whose chant *Lepanto* taught Vachel Lindsay his early art. This chant is among the half dozen greatest poems of the present century. Chesterton's pert essays, his brilliant short stories, his play *Magic,* his poems, lift him high in contemporary letters—belligerent, paradoxical, medieval-minded as he is. Distinguished in playwriting is the keen George Bernard Shaw, a verbose dramatic satirist, whose *Androcles and the Lion, Arms and the Man, Caesar and Cleopatra,* and *Joan of Arc,* are infernally witty and delightful. The Irish playwrights Synge, Lord Dunsany, Lady Gregory, have lifted Irish folk drama and sophisticated drama, in brief form, to a high level; the minor poet William Butler Yeats, and some of the poets of the Irish Revolutionary Brotherhood, were noteworthy in a low flight. The Scotch Sir James Barrie is the modern master of slim whimsey. In the novel and poetry modern England has done most; and, like all modern things, the story is evolving while you read these lines.

ADDITIONAL READINGS

CRITICISM OF ENGLISH LITERATURE. *History of English Literature,* by H. A. Taine, the great French critic, is one of the most brilliant and readable William Hazlitt's *Essays on Shakespeare* is informative; Frank Harris's *The Man Shakespeare* is splendidly conceived and written. The same author's *Oscar Wilde* is one of the best biographies in the language. G. K. Chesterton's *Robert Browning* is a model of brief biography. J. Thomas Looney's *Shakespeare Identified* is a highly important book upon the Shakespeare problem.

ENGLISH POETRY. The best collection of lyrics is found in Palgrave's *Golden Treasury of Songs and Lyrics.* Any of the older poets is available in cheap editions. The five best books of modern English poetry are:

The Shropshire Lad, by A. E. Housman.
The Ballad of the White Horse, by G. K. Chesterton.
The Listeners, by Walter de la Mare.
Collected Poems, by John Masefield.
Collected Poems, by Ralph Hodgson.

ENGLISH NOVELS. For a library of ten distinguished English novels, these are recommended:

The Way of All Flesh, by Samuel Butler.
The End of the House of Alard, by Sheila Kaye-Smith.
The Forsyte Saga, by John Galsworthy.
Wuthering Heights, by Emily Bronte.
Sons and Lovers, by D. H. Lawrence.
Three Sons and a Mother, by Gilbert Cannan.
Of Human Bondage, by Somerset Maugham.
Conrad in Quest of His Youth, by Leonard Merrick.
Zuleika Dobson, by Max Beerbohm.
The Old Ladies, by Hugh Walpole.

V. AMERICAN LITERATURE

COLONIAL LITERATURE

America began provincial to England, as England began provincial to France, France to Rome, and Rome to Greece. Captain John Smith, important in early Virginia history, wrote four prose studies of his travels, and several verses on American soil, one containing this advice to seamen:

If in or outward you be bound
Do not forget to sound;
Neglect of that was caused of this
To steer amiss.
The seas were calm, the wind was fair,
  That made me so secure,
  That now I must endure
All weathers, be they foul or fair.

The first verse written on an American theme was *Newes from Virginia, the Lost Flock Triumphant,* by Richard Rich; the verses were published in London in 1610.

In 1630 an anonymous northern colonist wrote an amusing description of American hardships in verse; in 1640 came *The Psalms in Metre, Faithfully Translated for the Use, Edification and Comfort of the Saints in Public and Private, Especially in New England*—the first volume to be published in the new land. This ran to twenty-three editions among the home-brewed saints, despite its drab lack of inspiration:

The rivers on of Babilon,
  There when wee did sit downe,
Yea, even then, wee mourned when
  Wee remembered Sion.

New England also fathered the Reverend Michael Wigglesworth, whose "laborious rhymes" make him a gem among early Harvard graduates. Silenced vocally in his pastorate by an affection of the lungs, Wigglesworth lifted strains which passed through six American and one London edition:

Still was the night, serene and bright,
  When all men sleeping lay;

Calm was the season, and carnal reason
Thought so 'twould last for aye.

Thus cantered on his *The Day of Doom, or a Poetical Description of the Great and Last Judgment, with a Short Discourse about Eternity.* There were also historical writings both north and south, and copious Puritan sermons in the north, Cotton Mather and Jonathan Edwards being foremost in these. In poetry, the North had Anne Bradstreet, Urian Oakes, and Phyllis Wheatley, the amazing Negro slave girl, with her gardened apostrophes:

Imagination! who can sing thy force,
Or who describe the swiftness of thy course?
Soaring through air to find the bright abode,
The empyreal palace of the thundering God,
We on thy pinions can surpass the wind,
And leave the rolling universe behind.
From star to star the mental optics rove,
Measure the skies, and range the realms above;
There in one view we grasp the mighty whole,
Or with new worlds amaze the unbounded soul.

The first single noteworthy poem written in America was an *Anacreontic,* by an anonymous Virginia gentleman, published in 1736. It has an exquisite lyric lilt, especially from the fifth line onward:

Old Poets sing the Dame, to Stone
Converted by Jove's radiant Son;
How Progne builds her clayey Cell
In Chimnies, where she once did dwell.
For me, (did Fate permit to use
Whatever Forms our Fancies chuse,)
I'd be my lovely Sylvia's Glass,
Still to reflect her beauteous Face;
I'd be the pure and limpid Wave,
In which my Fair delights to lave;
I'd be her Garment, still to hide
Her snowy Limbs, with decent Pride;
I'd be the Girdle, to embrace
The gradual Taper of her Wast;
I'd be her Tippet, still to press
The snowy Velvet of her Breast;
But if the rigid Fates denied
Such Ornaments of Grace and Pride,
I'd be her very Shoe, that she
With scornful Tread might trample me.

THE NEW YORK AND NEW ENGLAND SCHOOLS

But this pure strain was premature. In prose, Benjamin Franklin, the first American citizen of the world, wrote his *Autobiography* and many wise epigrams; John Woolman, a sincere Quaker missionary, wrote his *Journal,* in many ways comparable to *Pilgrim's Progress;* and there were admirable political essays in *The Federalist* and elsewhere. Washington Irving was the first professional writer in America. His facetious *Knickerbocker's History of Old New York,* a few of the tales like *Rip Van Winkle* and *The Legend of Sleepy Hollow* in *The Sketch Book,* and certain of his studies on Spanish themes, are still gently readable. Joseph Rodman Drake's *The Culprit Fay* is an uninspired yet charming fairy poem, far less than the achievements of William Cullen Bryant, an early distinguished New York writer of verse. Bryant's *Thanatopsis,* written at the age of seventeen, is his finest poem; perhaps this fact is the harshest criticism of his poetry.

America's most popular household poet was Henry Wadsworth Longfellow, a gentler Tennyson. His epic attempts, *Hiawatha* in a Finnish meter, and *Evangeline* and *The Courtship of Miles Standish* in 6-foot lines, are not nearly so effective as vigorous ballads like *The Skeleton in Armor.* He is best known for gentle moralistic verses of the type of *A Psalm of Life.* Ralph Waldo Emerson, a philosopher in epigrams, wrote charming essays full of nuggets of poetic beauty, and poetry of varying worth. The Concord Hymn has its own filed perfection; but fragments like the following best illustrate his authentic song:

> But what if Trade sow cities
>   Like shells along the shore,
> And thatch with towns the prairie broad,
>   With railways ironed o'er?
> They are but sailing foam-bells
>   Along Thought's causing stream,
> And take their shape and sun-colour
>   From him that sends the dream.
>
> He serveth the servant,
>   The brave he loves amain;

He kills the cripple and the sick,
  And straight begins again.
For gods delight in gods,
  And thrust the weak aside;
To him who scorns their charities
  Their arms fly open wide.

At times his nature glimpses are marvelous. But his work as a whole is too unpolished and fragmentary to linger on the peak.

The rugged Quaker versifier, John Greenleaf Whittier, for all the New England beauty of his pastoral *Snowbound,* usually was far more propagandist than poet; while James Russell Lowell, youngest of the New England group, had a borrowed glitter and borrowed themes, except in his vigorous dialect verses, *The Bigelow Papers.* Oliver Wendell Holmes was a prose wit and a writer of rare poetry, like *The Chambered Nautilus,* and more frequent witty verses. It is hardly necessary to do more than mention such lesser fliers in verse as Bayard Taylor from New York, and the more impressive group of Southern cavalier lyricists, Richard Henry Wilde, Edward Coote Pinckney, John Shaw, and Philip Pendleton Cooke.

EDGAR ALLAN POE

The first American poet of high rank, and one of the country's leading prose writers, was Edgar Allan Poe. Son of a well-born Georgian who took to the stage, Poe, at the death of his parents, was adopted by a wealthy Richmond merchant, John Allan, whose wife was attracted by the lovely child. The boy's lineage spelt waywardness and artistic vagabondage; the Allan environment, with drinking taught to the child as a parlor trick, emphasized these tendencies. School in England and the University of Virginia, a dismissal from West Point, a break with Mr. Allan after the death of his wife, and the young writer was launched upon his bitter years. A relative, Mrs. Clemm, took him into her household; and he married the beloved woman's young daughter, Virginia, only fourteen. He held frequent high editorial positions, and lost them through his dipsomaniac proclivities.

A few years after his wife's poverty-stricken death, Poe himself died mysteriously in Baltimore—the usual story being that his drugged body was used by political hoodlums as a repeater at the polls, until death resulted.

Poe's world-wide fame rests first upon his role as innovator of the modern short story, his work excelling both in the story of mysterious horror and in the ratiocinative detective story, which he invented. In poetry, at least half a dozen of his poems—the exquisite young lyric *To Helen, The Conqueror Worm, The Haunted Palace, The City in the Sea, To One in Paradise,* and a few more— entitle Poe to ranking in the top flight of America's poets. *The Raven* is his most popular poem, lacking slightly the utter magic of the five named; *The Bells, Ulalume, Israfel,* the ending of *Annabel Lee,* and a few others, are just under the best. His best music stands beside Coleridge, as in this passage from *The City of the Dead:*

> There shrines and palaces and towers
>   (Time-eaten towers that tremble not!)
> Resemble nothing that is ours.
>   Around, by lifting winds forgot,
> Resignedly beneath the sky
> The melancholy waters lie. . . .
>
> But, lo, a stir is in the air!
> The wave—there is a movement there!
> As if the towers had thrust aside,
> In slightly sinking, the dull tide—
> As if their tops had feebly given
> A void within the filmy Heaven.
> The waves have now a redder glow—
> The hours are breathing faint and low—
> And when, amid no earthly moans,
> Down, down that town shall settle hence,
> Hell, rising from a thousand thrones,
> Shall do it reverence.

The derivation of much of Poe's technique from that odd Georgia genius of the tenth magnitude, Dr. Thomas Holley Chivers, does not impair in the slightest Poe's enduring achievement. As critic, he was brilliant and modern; Europe ranks him high in this exacting role. As short story writer, he was innovative and enduring; as poet, in a few songs he reached the heights.

WALT WHITMAN

Far different was the strange bardic Long Islander, Walt Whitman. A wandering carpenter and journalist in his youth, at the age of thirty-six he published his first large slim *Leaves of Grass*, a yea-voice speaking with an authority unheard since the Hebrew psalms. The poems, in a strange polyrhythmic cadence (containing many types of rhythm to one line) derived from the poet's oratoric prose, but quickened their tempo until they reached, in their heights, authentic poetry. As paralysis overcast the poet's later years, due in part to his efforts as volunteer nurse during the Civil War, he reverted toward formal iambic verse, disguised in lines of irregular length; and toward more conventional religious and mystic themes. At his peak, he has not been equalled by any American singer; and his influence on successive generations of poets and writers has been monumental.

An example of his high lyric flight is furnished by this song from the vast *Song of Myself:*

Press close bare-bosom'd night—press close magnetic nourishing night!
Night of south winds—night of the large few stars!
Still nodding night—mad naked summer night.

Smile O voluptuous cool-breath'd earth!
Earth of the slumbering and liquid trees!
Earth of departed sunset—earth of the mountains mistytopt!
Earth of the vitreous pour of the full moon just tinged with blue!
Earth of shine and dark mottling the tide of the river!
Earth of the limpid grey of clouds brighter and clearer for my sake!
Far-swooping elbow'd earth—rich apple-blossom'd earth!
Smile, for your lover comes.

The great Lincoln threnody, *When Lilacs Last in the Dooryard Bloom'd* and lesser poems such as *On the Beach at Night* and *Give Me the Splendid Silent Sun,* are as great; while his loftiest sustained flight is *Out of the Cradle Endlessly Rocking,* a magnificent ode up to the best of Keats, and more important to literature because of its more radical form. For literary form grows out of the worthy achievements of the experiments, rather than out of the rut-followers.

SIDNEY LANIER AND EMILY DICKINSON

Whitman's influence came primarily from his attitude, which consisted of a worship of self expanded to include all men, a definite stand in favor of the equality of the sexes, and a general extollation of democracy. Adah Isaaks Menken, glittering actress and poet, who died in Paris in 1868, was a lesser feminine Whitman, independently developing a similar polyrhythmic verse. Sidney Lanier, a Georgian, is the third of the great early trilogy of American poets. His over-saturation with music made his greatest work experimentation that did not quite succeed; but it earns him a place far ahead of the more tepid New York and New England singers. Like Whitman, he surged with social passion, as in this portion of the vast *The Symphony:*

> Yea, what avail the endless tale
> Of gain by cunning and plus by sale?
> Look up the land, look down the land,
> The poor, the poor, the poor, they stand
> Wedged by the pressing of Trade's hand
> Against an inward-opening door
> That pressure tightens evermore;
> They sigh a monstrous foul-air sigh
> For the outside leagues of liberty. . . .
> "Each day, all day," these poor folk say,
> "In the same old year-long, drear-long way,
> We weave in the mills and heave in the kilns,
> We sieve mine-meshes under the hills,
> And thieve much gold from the devil's bank tills,
> To relieve, O God, what manner of ills?
> The beasts, they hunger, and eat, and die,
> And so do we, and the world's a sty:
> Hush, fellow swine; why nuzzle and cry?"
> *Swinehood hath no remedy,*
> Say many men, and hasten by,
> Clamping the nose and blinking the eye.
> But who said once, in a lordly tone,
> *Man shall not live by bread alone*
> *But all that cometh from the Throne.*
>   Hath God said so?
>   But Trade saith, *No:*
> And the kilns and the curt-tongued mills say, *Go!*
> *There's plenty that can, if you can't: we know.*
> *Move out, if you think you're underpaid.*

The poor are prolific; we're not afraid.
Trade is trade.

There is more of the musical magic in the *Marshes of Glynn* symphonies; even these are touched with his social vision. The strange walled music of Emily Dickinson, a Massachusetts singer whose work appeared posthumously, earns also high praise. Her glorious multitude of brief masterpieces, rhymed with a strange and delightful disregard for strict rules of rhyming, are worthy of extended quotation. Rather than her lyrics of sheer beauty or of bitter satire, there is this stern judgment upon life:

Apparently with no surprise
To any happy flower
The frost beheads it at its play,
In incidental power.
The blond assassin passes on,
The sun proceeds unmoved
To measure off another day
For an approving God.

POETRY TODAY

After this followed a fallow period, marked by the awakening of an interest in the exotic American Indian verse, and the vastly richer field of Negro poetry. Negro folk stories were retold by Joel Chandler Harris, in the *Uncle Remus Tales.* The word-music and tone-music of the Negro spirituals, or religious folksongs, comprise America's rich heritage of folk music. Such songs as *Deep River, My Lawd What a Mournin', Were You There, Crucifixion,* and *O Freedom* are unsurpassed. We give the last of these:

O Freedom! O Freedom!
O Freedom, over me!
And before I'd be a slave
I'd be buried in my grave,
And I'll go back to my God
And be free.

Among vigorous American poets with some Negro blood are James Weldon Johnson, Paul Laurence Dunbar, Claude McKay from Jamaica, and the two recent singers, Countee Cullen and Langston Hughes. Every Southern state, and many Northern ones, possesses one or more noteworthy Negro poets.

The brief masterly free verse or polyrythmic poems of Stephen Crane the novelist, the slimmer song of Richard Hovey, the social vision in poems and dramas of William Vaughn Moody, and the eloquence of Edwin Markham's *The Man with the Hoe* and *Lincoln,* filled in the gap between the early song and the 1914 awakening of the land's music.

The consensus of critics is that the greatest among our living poets are Edwin Arlington Robinson and Robert Frost, both New Englanders. Robinson is brilliantly mental in his attitude; Frost lets sterile New England speak through his quaintly beautiful poems, sensitively attuned to a conversational speech and rhythm, and restricted to native themes. Robinson's brief character studies, such as *Richard Cory, Reuben Bright, Aaron Stark* the miser, *Isaac and Archibald,* the exquisite *Flammonde,* and a dozen more, are magnificent. His rewriting of the Arthurian legend, in *Merlin, Lancelot,* and *Tristram,* makes Tennyson appear amateurish and vapid. He is a great poet in all of his writings, and a disillusioned seer in his judgment of the world:

> If you see what's around us every day,
> You need no other showing to go mad.
>
> I'm glad they say that there's another world,
> For this one's a disease without a doctor.

A limitation is his silence or over-conservatism on modern problems. He does not offend; there have been stern truthsayers who did. His pessimism of outlook alone submerges him below the heights of song; for man can not fly above the sun on wings of denial. Frost stands or soars beside him, in freshness of theme, treatment, and living vocabulary. His rhythm is exquisitely colloquial:

> Part of a moon was falling down the west,
> Dragging the whole sky with it to the hills.
> Its light poured softly in her lap. She saw
> And spread her apron to it. She put out her hand
> Among the harp-like morning-glory strings,
> Taut with the dew from garden bed to eaves,
> As if she played unheard the tenderness
> That wrought on him beside her in the night.

Edgar Lee Masters is noted for one book of brief prosy epitaphs, *Spoon River Anthology,* which became a non-fiction best seller. His other volumes are negligible. John Hall Wheelock is an impassioned lyricist, with something of the ecstasy of Sidney Lanier's higher notes in his ode-like apostrophes to sea and dune and consciousness, that "bright fort against oblivion." Edna St. Vincent Millay is a singer of exquisite music, dimmed by her omnipresent and tinselly cleverness. Yet some of her sonnets, little songs like *Travelling,* the shaped sweep of *The Poet and His Book,* and the sincere wit of *The Singing Woman from the Wood's Edge,* will outlast her poems dealing in utter frankness with her intimate love affairs. Amy Lowell, hailed by many as an outstanding poet, is slowly subsiding since her death to the lesser position of a celebrity rather than a poet, compounded of glitter rather than substance. Her critical studies are marred by slips in grammar and a general insensitivity to beauty; her dominant cry of unfulfilment in love, and her tendency toward praise of the Sapphic attitude, make her the laureate of no large group.

Vachel Lindsay is memorable for his earlier chants, *The Congo, The Chinese Nightingale, Simon Legree,* and a few more—a splendid revival of the ancient chant, half-song and half-poem. His work, especially when rendered aloud correctly, is emotionally effective in a high degree: and this is the ultimate test of poetry's content. Carl Sandburg is an exquisite and brutal poet, using a fluidic free verse, with a tendency to slip into eccentric nonsense. Elinor Wylie is a flawless psychologic singer of great beauty, her theme limited to her own sense of her life. Rose O'Neill is a queer throwback to the singing age of Campion, her mission being

> To lift for night's sweet thieves my houseless horn
> In broken rhythms of the windy grass.

For pure music she is unrivalled among Americans. Among the more promising younger poets is Joseph Auslander, with utter control of his medium, and a message not yet clarified by emotional and mental experience; while Witter Bynner, Grace Hazard Conkling, Robinson Jeffers, the splendid sonnetteer Arthur Davison Ficke, the lyricist Orrick Johns, and the earlier song of James Oppenheim, merit more than this slight mention. In light verse the facile rhymester Guy Wetmore Carryl, Gelett Burgess, Arthur Guiterman, and a few newspaper columnists, have been noteworthy.

EARLY FICTION

The first full-length prose romancer was James Fenimore Cooper, whose sentimental *Leather-Stocking Tales,* dealing with rude pioneers and Indians as if they were Sunday School superintendents, are still spicy fare for adolescent intellects. His sea stories are less artificial. Once popular novelists like the Southerners William Gilmore Simms and John Esten Cooke, and John Neal in the North, are today largely forgotten. A far greater writer, the strange spinner of sea yarns, Herman Melville, commands an audience still. His South Sea romances, *Omoo, Typee,* the mad *Mardi,* and the vast story of the pursuit of the white whale, *Moby Dick,* rank him as a stupendous if not an artistic story-teller.

More noted than any of these was Nathaniel Hawthorne, who rose from simple retelling of classic myths in *Twice-Told Tales,* and the apprentice stories of *Mosses from an Old Manse,* to the majesty of *The Scarlet Letter,* the first worthy novel written in America. This story of adultery and its social condemnation is themed like *Anna Karenina;* but the aloof art of the Russian is missing in the New England Puritan. Hawthorne, flowering of his environment, must remain a moralist, even if his morality transcends the rigid code around him; and the great novelists let life speak, rather than pass judgment upon it. Neither in *The Marble Faun* nor any of his later novels did Hawthorne quite equal his first great success.

Passing by ephemeral best sellers, Parson Weems' *Life of Washington* and the sentimental anti-slavery propaganda of the *Uncle Tom's Cabin* of Harriet Beecher Stowe, and greeting with a mere mention the short stories of pioneering life of Bret Harte, and the epigrammatic tales of O. Henry, a lesser de Maupassant with Anglo-Saxon censoring, we come to William Dean Howells, hailed as a realist. He is a realist of the parlor variety; his *Rise of Silas Lapham* and *Indian Summer* strove valiantly to furnish a taboo-ridden Anglo-Saxon public with what modified realism it could stomach.

An outstanding writer was the humorist Mark Twain, whose picaresque masterpieces of boyhood, *Tom Sawyer* and *Huckleberry Finn,* are written by a story-teller of high rank; and whose occasional short stories, including the satanic *The Mysterious Stranger,* showed a critical intellect of high value beneath the jester's motley. Many pay high tribute to the involved fiction of Henry James, master of indirect expression and infinite qualification of the simplest statement; but his Hamlet-like indecision prevented his actual achievement of enduring novels. A voluntary expatriate to England, due to his distaste at crude American provincialism, his *The Portrait of a Lady,* and such underwritten shockers as *The Turn of the Screw,* are hailed as masterpieces by certain critics; yet among these are many of the young intelligentsia who are no weightier than the suds of literature.

In fields other than fiction, the century before the present was marked by the pleasant nature sketches of Henry David Thoreau, his *Walden* and other studies being clearly-visioned appreciations of a nature-lover's fondness for his liberal inamorita. The speeches of Abraham Lincoln are marked by the limpid simplicity of Biblical language; his *Gettysburg Address* is as exquisite writing as Browne's *Urn Burial.* Francis Parkman's *Oregon Trail,* a first-hand study of the Westward continental trek, is far more valuable than the derivative historical writings of endless Prescotts, Motleys, and Bancrofts. Recent critical writings, such as *The Ordeal of Mark Twain* by Van Wyck Brooks, *The Fabulous Forties* by Meade Minnegerode, the *Life of P. T. Barnum* by M. R. Werner, and *Damaged Souls* and other studies by Gamaliel Bradford, together indicate America's coming of critical age. Outstanding among these is Thomas Beer's *Stephen Crane,* a biography as absorbing and deftly handled as great fiction. Beer's *Mauve Decade* glitters more; but the biography is so far his supreme work.

MODERN FICTION

Among lesser charms of modern American fiction may be mentioned the delicate romance *Monsieur Beaucaire* and the realistic *The Magnificent Ambersons,* by Booth Tarkington, one of the Hoosier or Indiana writers; the style-corrupted *Rise and Fall of Susan Lenox,* by David Graham Phillips; and the earnest *The Damnation of Theron Ware,* by Harold Frederic, which fails today only because its theme, tepid liberalism within the church, no longer stirs our emotions. Much more enduring is the astonishing picaresque tale of Negro life in the Barbadoes, *The Wooings of Jezebel Pettyfer,* by the English expatriate Haldane MacFall—a vivid series of tropical pictures by a master of brisk word-usage.

In the field of the short story, *The Yellow Wall Paper,* by Charlotte Perkins Gilman, an amazing story of a woman's going insane, told from the inside, is worth all of the shoddy shockers of Ambrose Bierce. Sherwood Anderson, author of such depressingly subjective novels as *Many Marriages* and *Dark Laughter,* does not escape, in these, from an unnatural and unconvincing series of adolescent wish-fulfilments. Among his short stories, *I'm a Fool, Hands,* and some others, by virtue of gripping sincerity and a use of the actual speech idiom, are masterly. The intricate narratives of Wilbur Daniel Steele, for all their frequent obscurities, are worthier far than the deteriorating art of Fannie Hurst and Edna Ferber, who are excellent examples of the degradation in literature that is induced by courting the audiences of popular magazines with a circulation running into the millions. Greatest among American short story writers of today is Ring Lardner, whose *Champion* is one of the most masterly stories written in the land—hard, brutal, unsoftened by any temporizing. The amiable *The Golden Honeymoon,* the rollocking *The Facts,* the penetrating *Some Like Them Cold,* the masterly *The Haircut,* are the American acme of this difficult medium.

One of the strange phenomena in American literature is the zealous propagandist Upton Sinclair. His significance lies more often in his energy and his constant output than in his artistic achievement. *Manassas,* by Sinclair, is among the few vital Civil War novels, and *The Jungle,* but for its weak Utopian ending, is one of our outstanding realistic novels. *Oil,* Sinclair's latest novel, is much his best. Its finale is magnificent, more than redeeming a slow start. Important also was the deteriorating Jack London. His earliest story, *The Call of the Wild,* a tale of a dog's reversion to the wilderness, is a magnificent slight thing; this was his best. He became obsessed with turning out so many words a day, at the top market price; and while *The Iron Heel, The Game,* and *The Sea-Wolf* are good stories, most of the autobiographic others are excellent examples of bad writing.

A strangely incomplete writer was the journalist Stephen Crane, whose *The Red Badge of Courage* is widely hailed as one of the chief fictional achievements of America. It is a vigorous Civil War story, its action moving under a cloud of fear working upon the heart of an average young conscript. It lacks that indefinable something that would have sent its speech to the heart. In Frank Norris's *McTeague* we have a novel falling just below world greatness. This story of the blundering life of an illiterate and untrained giant of a Western dentist, of his wife's gold-madness, the husband's murder of her, and his flight southward to a dreadful death in Death Valley, is realism told with the touch of genius. More acclaim greeted *The Pit* and *The Octopus,* two stories concerning wheat by the same author; but *McTeague* remains his peak.

Brand Whitlock's *J. Hardin and Son,* strangely unnoticed at the time of its appearance, is as great a novel. Its picture of the conflict between pious father and son stained with the same piety, resulting in the son's abandonment of the woman he wanted for the wife he properly detested, is sound and gripping. A novel almost as successful is Harvey Ferguson's *Capitol Hill,* which pictures the mid-circles of diplomatic life in the city of Washington; but the drawing is too scanty to satisfy.

One of the heartbreak Hamlets, the almost great, is *Hagar's Horde,* by George Kibbe Turner. The atmosphere, of brooding fear over the coming of the yellow fever into Memphis, is done with the effectiveness of Poe's best atmosphere stories; only the unneeded melodramaticity of the plot spoils the totality. Like Jack London, Fannie Hurst, Edna Ferber, and Joseph Hergesheimer, this author has deteriorated into a furnisher of shoddy machine-made stories for magazines of over a million circulation. The average intelligence of their readers is placed by psychology far below mental maturity; and editorial pandering to this sea of ignorance, insisting upon fouling American fiction with pathetic success endings and abiding unrealism, is a constant poison to our literature.

Hergesheimer, in his first stories, *The Lay Anthony, Mountain Blood, The Three Black Penneys,* and the group called *Gold and Iron,* proved himself possessor of a splendid colorful style, and an artistic restraint. And then the shadow of cheap magazine approval fell across him; and such mediocre performances as *Linda Condon* and *Cytherea,* which followed, ended the promise in a golden wallow of mere popularity. The American popular magazine is no impotent Circe; her service is a fouler plague to the spirit than the Black Plague which half killed Europe.

Out of this shadow moved Sinclair Lewis, with his unintended best sellers *Main Street, Babbitt,* and *Arrowsmith,* brilliant photographic satire directed against the externals of American village and city life. His *Elmer Gantry,* caricaturing a preacher wastrel, is less effective. Willa Cather, author of the pioneer chonicle *My Antonia* and the excellent *Youth and the Bright Medusa,* was never under this shadow. She writes as exquisitely as Sherwood Anderson at his best; her fault is the dominant trait of formlessness. A world master of fiction, like Flaubert or Samuel Butler, writes with an apparent formlessness; but the true vision of life, with its inevitable up- and down-going, gives an enduring form. A lesser artist, like Miss Cather, ends in a welter of formlessness. Her vision of life, moreover, is stained by a subjective identification of herself with some important character in each story, whose actions become unnatural when he comes under the influence of the author's own inhibitions. She is a gifted failure; how higher a fate than to be a popularity-wheedling success!

Realism has recently crept into the field of Negro life in the South, in such books as *White and Black* by H. A. Shands, and the North Carolina plays of Paul Green. America's most monumental realist is Theodore Dreiser, a crude Titan of volcanic force and elemental insensitivity. His earlier novels, *Sister Carrie* and *Jennie Gerhardt,* were accurate picturings of women who slipped into the hands of desiring males. From this he turned to two of a projected trilogy, *The Financier* and *The Titan,* the story of the financial wrecker Frank Cowperwood, and his successes with women, and his successes and failures in the lawful piracy of American big business. This torso is the epic of the American business man: a startling picture of the small-wits who batter their way to the top of the pile of bruised humanity. *The "Genius,"* which followed, showed Dreiser autobiographic, and at his best. The mammoth *American Tragedy,* which has recently appeared, is brilliant in such incidents as the life of a bellhop in a Kansas City hotel, and the social rise of an average young man in a New York collar-manufacturing town. But it is hardly more than an expanded newspaper and court report of an actual murder trial; any of Dreiser's other novels is greater as a work of literary art.

Yet literary art is a strange house in which to speak of Dreiser; for he is the most artless of American novelists. He rarely writes a sentence of good English. He is insensitive to word beauty; he flounders on in page after page of sprawling verbiage, at times, in his zeal to inform a hypothetical future audience, outdoing an encyclopedia in drab factual statements concerning mere paraphernalia of the environment, remote from the human struggles that are his theme.

His very bulk makes him our greatest novelist; his natural limitations inhibit his ever producing a single novel flawlessly great.

Any literary judgment, of course, can only be at best the critic's honest expression of opinion; its ultimate acceptance lies, not with the critic, but with successive generations of readers. Each reader of this study is always referred to the works themselves, rather than expected to accept critical decrees as being iron edicts of thought. A novel like *Nigger,* a study of racial conditions in Alabama as seen by white eyes, was high art to Northern critics, and outrageous untruth and lack of literary merit to most Southern critics. Both, if sincere, were right; only the weight of future opinion can determine enduring literary ranking. Thus, to this one critic, and many more, Dreiser is a monumental cobbler in literature.

One short novel, by prolific Edith Wharton, is far greater as a work of literary art than all the writings of Dreiser. This is the astounding *Ethan Frome.* Equally with *McTeague,* this is a story of poverty; but the New England poverty is stark and dreadful, compared to the stunting semi-poverty of California. Ethan Frome, a gaunt Massachusetts farmer, married through sympathy to his wife Zeena, sees her slowly grow into a complaining invalid. He is overborne in a swift flood of utter love for his wife's cousin, Mattie Silver. The wife drives the girl out of the house; and Ethan can not in any way raise enough money to take himself and Mattie away . . . poverty, utter poverty. As he takes Mattie to the station for her departure, she suggests that they coast down an icy hill; and urges him to steer for collision with a tree, that will mean death to the two of them. He tries, but the life force makes him hit it obliquely, merely crippling Mattie and himself for life. The story ends with the three of them, invalid Zeena, crippled complaining Mattie, crippled Ethan, bound together by poverty and physical injuries into a living hell. The rest of the author's work can be forgotten; this is a masterpiece.

Abraham Cahan, in *The Rise of David Levinsky,* has written a full-length novel as perfectly formed. It takes its hero, a Talmud student in a European ghetto, across to America, where he becomes a "greenhorn" pushcart peddler, and ultimately abandons his ideal of intellectual growth to rise in the clothing trade to the success of being a millionaire: every truthful word of the chronicle indicating the hideous failure of this success. A more recent novel, *Backyard,* by Gloria Goddard, seems destined to rank beside these. It is a story of the alterations in social classes in America, seen through the changes on the backyard clothes-lines of an alley, with its twelve houses of the poor on one side, its three middle-class mansions on the other, and the vast Martin place at its head. The middle-class families wilt into liasons and failure; the Martin girl elopes with her chauffeur, and ends next door to families of Polish immigrants on the poor side of the alley; the Irish contractor rises from the depths of the poorer side to ownership of part of the other side of the alley, and residence in the palatial apartment house that supplants the Martin place. All told brilliantly, and with pure objectivity; a tour-de-force as amazing and innovating in novel writing as Jules Romaines' *The Death of a Nobody.*

The most exquisite novelist in America is the romanticist James Branch Cabell. His chronicles of his mythical medieval Poictesme, *Jurgen, Figures of Earth,* and *The Silver Stallion,* are perfect in telling and universal in theme. The cycle of Jurgen, including his affairs with Helen of Troy, the moon-myth Anaitis, Guinevere, and others, ends with his acceptance of his plain scolding wife, instead of the world's loveliest queen; the second novel mentioned tells of Manuel, redeemer of Poictesme; the third, of the growth of the Manuel legend (Manuel being a blend of Jesus and Woodrow Wilson). The last of these is slim in spots, but its glorious opening of the window out upon the making of universes is one of the high spots in all Cabell. None of the writer's other books quite reaches these three; they are among the crowns of American literature.

American drama, outside of a few highly promising one-act plays by Paul Green and a few others, and a flood of Broadway products generally sagging toward the nadir, consists of the writings of Eugene O'Neill and George Kelly, both Irish-Americans. O'Neill's *Beyond the Horizon, Emperor Jones, Love Under the Elms,* and *The Great God Brown,* are his most effective dramas; although all of his work throbs with a striving sincerity and a constant healthy experimentation. Kelly, in *Craig's Wife* and *The Torch-bearers,* has done lesser dramas of high value. A word must be said of the literary achievements of Latin-America. The novels *Canaan,* by Aranha, and *A Brazilian Tenement,* by Aluizio Azevedo, are both starkly realistic; and the poems of Ruben Dario and others are noteworthy, and highly significant to their own lands.

Thus we have seen the provincial attitude of America alter, in Poe, Whitman, Lanier, Emily Dickinson, and more than half a dozen modern American poets, to a complete weaning, and a stride toward full national maturity in literature; we have seen a literature growing in critical studies, and rich in significant names and volumes in fiction. The spirit of America is, in origin and environment, upward looking and admirable; working against this are the corrupting forces of success-worship and capitalistic materialism. The future will show the two in increasing conflict. The victory of the former will mean a national soul; of the latter, an empery of robots, of mindless human machines.

Only the poetry of the recent past possesses vital significance for the present; for poetry is the most concentrated expression of the soul's and the body's desires. When the desire has been generally satisfied, any literary product loses its greatness to subsequent generations. Such classics as the once-sophisticated *Aesop's Fables,* the Roman and Greek literatures, Chaucer and Milton, Thackeray and George Eliot, are no longer read today, except by high school and college students, and reactionary mentalities serving as professors and literary authorities. Even Shakespeare is known best through spotlighted altered versions on the stage, and academic readings. A little of the most concentrated poetry of the past holds charm still; and the poets and novelists of today are phrasing the yet unsurfaced gropings of men toward the future.

In the end, the sophisticated classics of today and the near yesterday become the nursery tales of tomorrow. *Aesop's Fables, Robinson Crusoe,* the *Arabian Nights,* the myths of man's childhood, become bassinet fare. Soon enough Rabelais, *The Genius,* and *Jurgen* will be lisped by babes at the bottle. And the race will have progressed onward to more sophisticated utterances of its fiction writers, to more concentrated lyric cries of its poets . . . and, most of all, to common understanding and dissemination of the vaster wonders of science, reaching back to the faint beginnings of things, and forward toward the shrouded endings.

ADDITIONAL READINGS

CRITICISM IN AMERICAN LITERATURE. The critical fragments of Poe, and studies of poetry and the novel by Sidney Lanier, are penetrating, in spite of the overly moral attitude of the second. *Poets of America* and the life of *Amy Lowell,* by Clement Wood, are surveys of recent American poetry. *Convention and Revolt in Poetry,* by John Livingston Lowes, is a brilliant study of altering standards. *Stephen Crane,* by Thomas Beer, and *The Ordeal of Mark Twain,* by Van Wyck Brooks, are splendid interpretative biographies.

AMERICAN FICTION. For a library of distinguished American novels, the following list is recommended:

Ethan Frome, by Edith Wharton.
McTeague, by Frank Norris.
The Rise of David Levinsky, by Abraham Cahan.
J. Hardin and Son, by Brand Whitlock.
The "Genius," by Theodore Dreiser.
Jurgen and Figures of Earth, by James Branch Cabell.
Hagar's Horde, by George Kibbe Turner.

For collections of short stories:

How to Write Short Stories and *The Love Nest,* by Ring Lardner.
Horses and Men, by Sherwood Anderson.

AMERICAN POETRY. The writings of Poe, Lanier, Whitman, and Emily Dickinson are available in cheap collected editions. For the four best volumes of recent poetry, the following are recommended:

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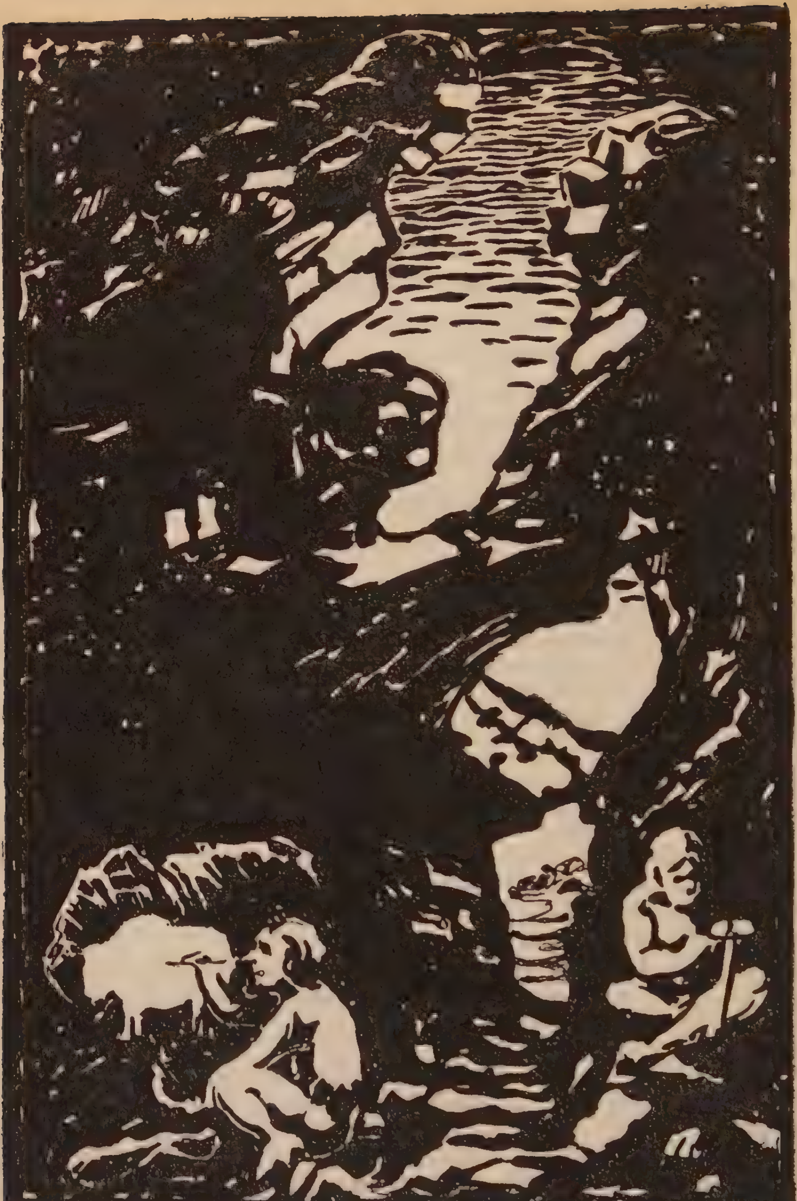


Louis Bromberg

To shape of stone or swift breath
A dream that can outlive death,
To etch one's longing indelibly
On all men living or to be!

BOOK IV

THE OUTLINE OF ART

I. PAINTING

AMONG PRIMITIVE MEN

The Fine Arts include the five greater arts of painting, sculpture, architecture, music, and poetry, together with such lesser arts as dancing, drama, embroidery, pottery, glass-making, the goldsmith's art, jewelry, even down to such practical arts as cabinet-making and gardening, where their object is beauty, and not utility. We have studied poetry in Book III: *The Outline of Literature;* and will take up here the four other greater Fine Arts, as well as dancing and cabinet-making, with a mention in the appropriate place of the other fine arts.

Modern man pays less attention today to the arts than to history, science, literature, religion, or even philosophy. This is because the social ideal, based largely upon commercial success, has small place for the arts, which require some leisure and study even for appreciation. There is a widespread feeling that time spent upon art renders a man or woman less fitted for commercial success. As Haldane observes brilliantly,

> The capitalist's idea of art in industry at present tends to limit itself to painting green and white stripes on the front of his factories in certain cases. . . . Before long someone may discover that frescoes inside a factory increase the average efficiency of the worker 1.103% and art will become a commercial proposition once more.

Thus beauty will come riding back, mounted upon the steed of commercial success; and man will profit by the return engagement of this social messiah. Beauty is that quality in the arrangement of phenomena which pleases the senses, ranging from the beauty of the Taj Mahal or the Venus de Milo to the beauty of an orderly kitchen. The capacity for appreciating beauty differs in every individual; perhaps it may be said with more accuracy that standards of beauty differ for every individual. Criticism of art is similar to criticism of poetry; each man or woman must be his or her own final critic.

This capacity for appreciating beauty, or the esthetic sense, as we have pointed out in Book II: *The Outline of Science,* developed as a by-product of sexual selection, rooted in the female's choice of a mate pleasing to her senses. It has evolved to a taste that can appreciate Beethoven's *Moonlight Sonata* or George Gershwin's latest bit of popular jazz, that can thrill emotionally to a landscape by Courbet or Corot, or a comic strip by Bud Fisher. The motive for the creation of fine art is always a subjective one; the higher art products are always expressions of the subconsciousness of the artist. Rather than adopting Comte's classification of the arts in the order of their increasing complexity, thus: architecture, sculpture, painting, music, and poetry; or Hegel's more metaphysical similar classification; or Lotze's division of the arts on the basis of imitation, placing music first, and architecture second, because of their lesser amounts of imitation—let us study the arts somewhat in the order in which they appeared among men, commencing with painting.

Painting is that shaping or space art, whose function is to express and arouse emotion by the imitation of all kinds of natural phenomena, reproducing on a plane surface the relations of their boundary lines, lights and shadows, or colors, or all three of these together. The impulse to draw, either in the naturalistic or decorative manner, appeared early among men; it consists in the artist's making an outline with colors darker or lighter than the surface on which he is working. Charcoal, ochre, and chalk were in use from very ancient times; when these colors were applied wet, man had commenced painting. Modern painting expresses relief, or the depth of an object, as well as its height and breadth; primitive painting was limited to rendering the color of the object in the flat.

The dawn of art came in with the Upper Paleolithic or Chipped Stone Age of man, from 50,000 to 25,000 years ago. Europe was then settled by the Grimaldi Negroid race, the magnificent Cro-Magnon race, and lesser races of men. The famous cavern of Altamira, at Santillane, near Santander, Spain, with its exquisite ceiling of polychrome or many-colored paintings, of bison, horses, deer, and boar, is the most admirable instance of this early art; localities throughout France, and in Germany and England, also illustrate it.

Painting in Egypt was from early time reduced to certain artistic conventions. Almost invariably the head of the subject was given in profile; only in the case of subordinate figures was the front, back, or three-quarters view of the head permitted. Such strange results followed as of a figure with head in profile, eye full-face, shoulders front view, breast three-quarters, and hips in profile. Even animals were treated with similar strange conventions; yet, in spite of this, the truthful rendering of nature appears in many of the paintings. Scenes of domestic life and great battle panoramas are reproduced with equal conventional fidelity.

The prehistoric Mycenean tombs and palaces of Greece show a distinct advance toward naturalness. The Dorian migration wiped out this art; and it was not until 800 B.C. that the new Greek spirit manifested itself in painting. Eumarus of Athens and Cimon of Cleonae were two early expanders of the art. The great advance was made by Polygnotus about 420 B.C. His paintings were in the Poecile portico at Athens, and in the public hall at Delphi. His pictures of episodes from the Trojan wars were described by ancient writers as rich in coloring, and thronged with lively human figures, although still in profile. Apollodorus of Athens, and his greater pupil Zeuxis of Heraclea, about 400 B.C., as well as Parrhasius, the latter's rival, reproduced nature with a fidelity that is still legendary, as in the story of Zeuxis' grapes that living birds came to peck at; and in Parrhasius' painting of a curtain so lifelike that the judges asked him to remove it—when the curtain was the picture. Painters in the Alexandrine period inclined toward technical excellence rather than grandeur, although the *Venus Anadyomene,* a picture of Venus rising from the sea, by Apelles, marked the height of Greek painting.

Etruscan painting evolved from the stiff rigidity of Eastern work to the grace of Grecian art. Roman art never became anything but Greek, either consisting of copies of Greek masterpieces, or original work done by Greek painters. The pictures found in buried Pompeii and Herculaneum are painted in *distemper,* or in water colors mixed with egg, gum, or glue. The house known as that of the Tragic Poet, and the house of the Dioscuri, contain paintings of exquisite beauty, reproducing scenes from many of the more popular myths. The coloring is intense, and the whole treatment lifelike. The scenes from the life of Adonis in the Baths of Titus, and the excellent portrait painting of Marcus Ludius, also reached a high stage of excellence.

The Christian catacombs of the first two centuries contained merely symbols, in the church's opposition to pagan worship. By the 4th century, we reach pictures of Christ as the Good Shepherd, as Orpheus taming the beasts with his lyre, and kindred representations. The Catacombs of St. Calixtus contain excellent examples of this, as well as a finely executed early portrait of Christ. The 5th century Pontian Catacombs illustrate a growth in earnestness and majesty. When Christianity became the state religion, these paintings emerged into the light of the overground churches and basilicas. Manuscript illumination dates from the 9th century, or slightly earlier. The Italian Christians represented Christ as the most beautiful of men; the Byzantine school, through a differing philosophy, represented him without beauty of person. This latter school declined after the 13th century; at about this time, Italian art awoke into the modern period, in which painting is the story of individual painters.

PAINTING IN ITALY

Giovanni Cimabue (1240-1302) has been called the father of modern Italian painting. His colossal Madonna in the church of S. Maria Novella, in Florence, is his best existing work. His most famous contemporary was Duccio Buonnisegna of Sienna (1260-1340), whose paintings in the cathedral of Sienna at times excel those of Cimabue. Art now branched into the Florentine and the Siennese schools. Of the former Giotto (1276-1336), a pupil of Cimabue, was preeminent, as head of a school of allegorical painting. His pupil Taddeo Gaddi (1300-1367) was the most significant figure in the 14th century. Chief among the Siennese school, which aimed at spiritual expression rather than exact photography, was Simone di Martino (1284-1344).

With the 15th century, the Renaissance came in. Masaccio (1402-1443), Fra Angelico da Fiesole (1387-1455), and Filippo Lilli (1412-1469) were the chief opening figures, the second founder of the naturalistic school, the third of the mystic or idealistic school. Fra Angelico's works throb with spiritual charm; Fra Lippi, after an adventurous life including captivity by African pirates and an ample pursuit of pleasure, painted with immense ease and dignity. Sandro Botticelli (1437-1515) was the first of the great series of painters in the famous Sistine Chapel of the Vatican. Andrea Mantegna (1430-1490) was the foremost painter in the north of Italy during this century; Venice saw the work of the famous Bellini brothers, Giovanni Bellini being the teacher of Giorgione and the great Titian, the latter unsurpassed for his absorbing pictures of women, often with hair tinted with that reddish hue that received its name from his fondness for it. The Umbrian school, in the mountainous district of upper Italy, produced Perugino (1446-1524), famous for his purity of coloring and his knowledge of perspective. His greatest pupil was Raphael Sanzio (1483-1520), surnamed Il Divino, or The Divine, most universally popular of all painters, and hailed as the greatest by critics who believe there can be a greatest in art. In his brief life his versatility and growth in control of his medium are without parallel. His celebrated frescoes of the Sibyls in S. Maria della Pace are his greatest achievements in this field; and at his death, at thirty-seven, his body was laid out in state in his studio, beneath his unfinished *Transfiguration,* while Europe mourned.

The 16th century was the golden age of Italian painting. Leonardo da Vinci (1452-1519) was a universal genius, oddly crippled by a strange internal complex. His *Mona Lisa del Giocondo* and *John the Baptist* are two of his most haunting canvases. He was sculptor, painter, musician, poet, and scientist. The great Florentine, Michael Angelo Buinarotti (1475-1564), outranked the greatest of his contemporaries as architect, sculptor, and painter. His figures have a mystery and awful grandeur all their own. His decoration of the vaulted ceiling of the Sistine Chapel is considered the most powerful painting in existence; his *Last Judgment,* in the same chapel, is as powerful, if less beautiful. Andrea Vannucchi, called Andrea del Sarto, was another outstanding Florentine, noted for his exquisite sense of line. Antonio Allegri, surnamed Corregio (1494-1534), founder of the Lombard or Parma school, lifted himself to the highest rank; the Venetians Tintoretto and Veronese, of the 16th century, ended the long line, and, after these, Italian painting slurred into a long decline.

THE NETHERLANDS, HOLLAND, GERMANY

Hubert Van Eyck (1366-1426) is called the father of modern painting in northern Europe. His brother Jan (1390-1440) is usually ranked as the greater painter of the two. Hans Memling, of the Flemish school, and Martin Schöngauer, of the German, made the 15th century distinguished. The next century saw the two Holbeins, the younger of these the greatest German realistic painter, and the teacher of all English painters. Albert Dürer (1471-1528) was the father of modern German painting, and was a master spirit able to stand beside all but the few greatest of the Italians. Imbued with a love of the fantastic and the grotesque, he found a worthy mate in the Saxon Lucas Cranach (1472-1513).

The 17th century saw a great revival in Flemish and Dutch art, led in Belgium by Peter Paul Rubens (1577-1640), great not only in majesty but in an inevitable human coarseness and a penchant for revolting scenes treated with terrible realism. His pupil, Anthony Vandyck (1599-1641), is especially noted for his portraits, a field in which he ranks beside great Titian. The Dutch school included Rembrandt Van Rhyn (1608-1669), a magnificent artist in both sacred and profane fields, a master of light and shade, whose portraits resolve themselves down to the two most significant phenomena, the face and the hands of the sitter, emerging out of a mass of shadow, with a full sense of existence in shadow; and Franz Hals (1584-1669), glorious for the human joy in his faces, a field in which Jan Steen (1626-1679) also shone. Jacob Ruysdael and Meindert Hobbema are celebrated for their daylight landscape scenes, and stand at the head of the Dutch school of landscape painting. In any of these lands and centuries scores more of worthy achievers might be mentioned; but this study can only mention the most outstanding examples of genius in painting.

THE SPANISH SCHOOL

The late residence of the Moors in Spain, and the draining influence of the Inquisition which followed, postponed the real birth of Spanish art until the 16th century. The settlement of a colony of Flemish artists in Spain awakened the land artistically; and the influence of Neapolitan and Venetian art grew steadily stronger. The first distinguished Spanish painter was Antonio del Rincon (1446-1500). Luis de Morales (1510-1586), also called The Divine, was marked by the austere asceticism of his sacred work. Toward the latter end of the 16th century flourished Domenico Theotocopuli, surnamed El Greco, excelling both in coloring and design, now regarded as a god by certain groups in the present-day renaissance.

Seville, in the 17th century, housed the two greatest painters of Spain's classic period. Diego Velasquez (1599-1660) ranks as a portrait painter beside Titian and Vandyck, and was one of the world's masters of naturalistic painting. Many of his subjects came from the humblest life of his times; his own stamp of authentic genius appears in everything we have of his. Bartholomé Esteban Murillo (1618-1682) was among Spain's masters in religious painting. The soft brilliance of his coloring, and the blend of patriotism and religion in his treatment, make his work quietly memorable. In such popular pictures as the *Immaculate Conception* in the Louvre, and the jolly *Spanish Flower Girl* and *Spanish Beggar*

Boy in English galleries, he represents a flowering of national and religious feeling.

The present century has seen, in Zuloaga and Sorolla, two outstanding painters, the first noted for his hard heavy grip upon his realistic subjects, the second for his use of flooding sunlight in his sea-coast scenes of bathing, swimming, and other activities. In Spain, painting is very much alive today; in certain Latin-American countries, notably Cuba, this is increasingly true.

IN FRANCE

Until the end of the 18th century, French art was merely suburban to Italian painting. The French school was founded by Nicolas Poussin and Claude Gelée, known as Claude Lorraine, both of whom studied and practiced in Italy. Poussin is founder of a heroic school of landscape painting; Lorraine's landscapes had a softer and more natural beauty. Early in the 18th century, the decorative Anthony Watteau (1684-1721) set the fashion for the French art of his time, his subjects being invariably drawn from the court demi-mondaines and cavaliers, whose high-handed parasitism upon the body politic ultimately produced the French Revolution.

Greuze (1725-1805) excelled in his depiction of female heads; Jacques Louis David (1748-1825) painted too strongly under the influence of sculpture to attain any approximation of the lifelike results of the great masters. Jean Ingres (1780-1867) combined the classicism of David with a beauty of expression and a fidelity to actual life rarely equalled in modern times. Eugène Delacroix (1798-1863), chief leader of the Romantic school, was one of the greatest of all French painters. As a colorist, he is often mentioned beside Rubens. His art was impetuous, and dramatically passionate. Gustave Courbet (1819-1877) excelled in a harsh realism, a healthy reaction against both Classicists and Romantics. Paul Delaroche (1797-1856) treated historical scenes with an accurate frigidity. The magnificent misty landscapes of Corot, the complicated group pictures of Meissonier, the work of Jules Breton, the sentimental peasant studies of Millet, the more sentimental work of the woman painter Rosa Bonheur, as in *The Horse Fair,* and the powerful drawings of Gustave Doré, best known for his illustrations of Dante and Milton, paved the way for the modern movement in French art.

Manet was the forerunner of this awakening, similar to the modern awakening in all the arts. His treatment definitely enlarged the methods of painting; his work never suffered from brash banality or eccentricity. Only in the hands of his intermittent followers, with their tendency to stray further and further from his work in the direction of imitative sensationalism, the method at times degenerated into grotesquely unsatisfactory art. Monet, Matisse, Renoir, Picasso, the eccentric Paul Gaugin, expatriated voluntarily to the Pacific Islands, all produced canvases of great effectiveness; at times all of these suffer from an affected modernism which detracts from the impressiveness of their achievements. Yet their studies at the root of art technique will aid their art for generations.

Paris is today the art school of the world. Most authentic of all the French centers is the *Retrospective des Independents,* with Cezanne, Seurat, von Gogh, Ottman, Braque, La Doux, and many more. The American J. Franklin Whitman, Jr., selects these as the most vivid forces in French art today. Fighting against the modern note is a return to the traditions of Ingres in the decorations of Du Pas and the paintings of Despujols. Paris today has its baker's dozen of little masters, each followed blindly by a troop of the pathetic camp-followers of art, who clutter up the walls of modern exhibitions. The ancient reactionaries are slowly dying off; their successors, the *Pompiers,* hold forth at the Summer Salon in a vast army of society portrait painters, daubers of picturesque landscapes, and sentimental love artists, with themes all hackneyed and conventional. The *Fauve* snaps its teeth at the *Pompiers,* its display ground being the *Exposition des Independents;* in essence the *Fauve* is a blend of naivete and stupidity. The worth-while French modern painters are outside all these groups, including such names as Ottman, Favory, Vlaminck, de Waroquier, Matisse, Despujols, and many more.

THE BRITISH AND AMERICAN SCHOOLS

Until the 18th century, English painting was done by foreigners, including Hans Holbein, Rubens, Vandyck, Sir Peter Lely, and the two Vanderveldes. William Hogarth (1697-1764) was one of the founders of a distinctively British school. A man of rough and sturdy nature, essentially a satirist, he had a keen sense of humor, a fine scorn of life's petty meannesses, and a faith in the ultimate triumph of beauty. He was essentially moralistic or didactic in his art. His co-worker in forming British art was Sir Joshua Reynolds (1723-1792), a distinguished portrait painter. Thomas Gainsborough (1727-1788), a contemporary, ranked high both in portraiture and in landscapes; Reynolds' *Age of Innocence* and Gainsborough's *Blue Boy* remaining perennial favorites, both slightly tinged with sentimentalism.

Benjamin West (1738-1820), an American by birth, made great progress in England in historical pageantry; John Singleton Copley (1739-1815), also born an American, was his rival in this field. George Romney (1734-1802) is noted as a dignified painter of portraits; Sir Thomas Lawrence (1765-1830) had more grace, but less strength, in his portraits. Joseph Mallord William Turner (1775-1851) placed the stamp of his own individuality on his splendid landscapes, stained with the gorgeous coloring of tropic sunrise and sunset; few painters of any time or country have excelled him here. John Constable (1796-1837) took as theme English cultivated scenery, almost the only field ignored by Turner. Sir Edwin Landseer (1802-1873) was distinguished for his paintings of animals, especially in their moods of repose. The poet William Blake painted half-mad masterpieces, deeply imbued with mystic feeling. The art criticisms of John Ruskin, and the conventionalized paintings of the pre-Raphaelite school (the Rossettis, Holman Hunt, and others), showed a reversion toward a dead classicism; while Watts, for all his sentimentalism, is worthy of mention for the wide popularity of his allegorical paintings.

America has produced, in addition to West and Copley, the early work of Washington Allston (1780-1843), and the early portrait painters John Trumbull and Gilbert Stuart, the latter noted especially for his paintings of George Washington. Recent masters of portraiture are John Singer Sargent and Robert Henri. The etchings of Joseph Pennell, James McNeil Whistler, and John Sloan are highly distinguished. Winslow Homer in his splendid studies of the sweep of vast ocean vistas is memorable. Among landscape painters, George Innes, A. H. Wyant, R. A. Blakelock, and Homer Martin are outstanding. Jonas Lie for his marine painting, E. A. Abbey for his conventional murals, Arthur B. Davies for allegorical subjects, are all worthy. Among the more modern practitioners, George Bellows, Rockwell Kent, John Sloan, John B. Luks, and William Glackens are the most impressive, with rich achievement to the credit of each. Thomas Eakins, for his portraits and genre studies, perhaps excels all these; for grandeur of imagination Albert Ryder is noteworthy. Other memorable figures are William Norris Hunt, Frank Daveneck, George Fuller, John La Farge, J. Alden Weir, and J. W. Twachtman.

OTHER LANDS

Chinese painting deserves mention, for its extreme isolation from Occidental influences. Chinese art depicts natural objects of every variety, combined with strange symbolic creatures like dragons. Japanese art is based upon Chinese art, and the great masters of Japanese prints have achieved results in this field that no other race has equalled. Both of these far Oriental nations ordinarily avoid perspective, in favor of a strange colorful fidelity to the isolated subject to be depicted; while a symbolic restraint characterizes the entire product.

Wood engravings, etchings, artistic photography, such elaborate embroidery as the great tapestries, must be dismissed with a mere mention; for the field of art is limitless, although so far the ordinary man and woman is barred from even a spiritual participation in it.

II. Sculpture

THE BEGINNINGS OF SCULPTURE—THE PRIMITIVES

Sculpture is defined at length as that shaping art, whose function is to express and arouse emotion by the imitation of natural objects in solid form, reproducing either their true proportions in three dimensions, or their true proportions in length and breadth only, with a diminished proportion in the third dimension of depth, or thickness. It is the harmonic relation between mass and void: the art of pure or elemental form, apart from its human meaning.

We have surviving examples of primitive man's sculpture quite as ancient as the earliest painting. At the Aurignacian level of the Upper Paleolithic Age, more than 25,000 years ago, especially as Bassempouy, in France, a number of ivory statuettes were found, chiefly representing women in the nude. These were markedly steatopygous, or large-buttocksed, and were similar to later ceramic or pottery statuettes found in the valleys of the Nile and Chaldea, and among living Hottentots. We have found that an early biologic invention consisted in the change from the animal posture during the love episode to the human posture; these early statuettes antedated the change, giving as the ideal of woman's beauty the part most visible during mating. The Venus of Bassempuoy and its kindred statuettes were carved on ivory; there was also the beginning of graving on stone, at the same Aurignacian level.

Higher in the Upper Paleolithic age, at the Magdalenian age of culture, are found sculptures on bone and ivory, representing a degradation in the art of sculptural representation. In ancient India, sculpture appears almost always in connection with architecture, and upon religious subjects. The earliest monuments of sculpture date from the rise into power of Asoka, about 250 B.C. These consist principally of reliefs on the outside of sacred buildings. The ruins of Mahavellipore preserve a fine group of gods and heroes in high and low relief, done with spirit and beauty. A rock pagoda at

Perwuttum preserves remarkable bas-reliefs representing a tiger hunt, with mounted huntsmen charging at full gallop. The reliefs on the entrance of the great Dagoba or Tope of Sanchi are vigorous battle scenes. Throughout India and the nearby islands huge images of Buddha, Shiva, and other Hindu deities are found. Bamiyan has a statue 120 feet high, and Ceylon several higher than 90 feet. The temple of Boro-Buddor, in Java, holds more than 400 small images of Buddha in the outside niches, noted for their utter repose and dreamy passivity. The women's figures replace liveliness with a soft voluptuousness; the faces cloy with a perpetual stony simper.

In Egypt, the Old Empire, centered at Memphis, running down to 2500 B.C., exhibited ancient bas-reliefs at the capital—sculpture once painted in vivid colors; as well as the huge Sphinx, 172 feet long and 56 feet high. At Karnak, a relic of the New Empire, which reached to 524 B.C., is the remains of the great avenue of sphinxes; while great seated figures of pharaohs are still found in splendid preservation. The world-famed statue of Memnon at Medinet Haboo, and the colossal Rameses II before his temple, must also be noted. The low reliefs on many tombs and temples, both below and above the surface of the ground, exhibited in full the history of many of the rulers. There were also splendid portrait busts, and reproductions of household articles, belonging to the pharaohs, queens, priests, and famous physicians. We have no names of Egyptian sculptors; but the art gains tremendous significance from the fact that it is the background of Grecian sculpture.

Babylon and Nineveh are preserved foremost in the bas-reliefs at Mosul, which are more varied, lifelike, and human than the Egyptian bas-reliefs. The lion-hunt from the north-west palace of Nimrud is one of the most memorable of these. Exquisite carved Assyrian gems have been found in abundance, engraved with figures of the gods. Persian sculpture is known today only from reliefs from the capital at Persepolis; in place of the scenes of action that characterize Assyrian sculpture, we have the king in repose, receiving tribute from the conquered world. Somewhat more aggressive is the tremendous figure on the great Behistun Rock, where the king is placing his foot on a prostrate enemy. Human-headed and winged bulls and unicorns are common; and the engraved gems excel even those of Assyria. The sculptured remains of Syria and Asia Minor merely reflect the neighboring cultures. China and Japan specialize in carvings of wood, ivory, and tortoise-shell; their vast Buddhas are of cast bronze.

In the Americas, Mexico, Peru, and some parts of Central America have magnificent rude remains of sculpture; man is just at the beginning of this rediscovery of American antiquities. The extraordinary totem-poles of the Alaskan Indians, carved both in wood and in black slate, are amazing conventionalizations of early gods and beasts.

THE SCULPTURE OF GREECE

Greece first lifted sculpture to an independent art. The Mycenean culture, stemming directly out of Egypt, is represented by such remains as the great lion gate at Mycenae, impressive in spite of its crudity. There are statuettes of women, and of bulls and other playful animals in ceramics or pottery, or colored majolica. The early Greek period is called the Archaic school, and showed a sculpture rigid and pure. Figures were first cut out of the trunks of trees, which accounted for the stiff position of the human arms, at the sides of the figures. When marble began to be used, at first the same poses were used, due to man's slowness to alter art's conventions. This archaic school controlled down to the work of Myron.

The names of the first Greek sculptors, Daedalus, Rhoecus, and his son and grandson, Glaucus of Chios the iron-smelter, Melas and Mikkiades from Ionia, Dipoenus and Skyllis, all about 580 B.C., are largely legendary. Spartan sculptors, ancient accounts say, next took up the art, and developed the wood and ivory work into cryselephantine (gold and ivory) statuary, which later became so famous. The Spartan artists Hecyles and Theocles carved a group in cedar wood, which was found in the Epidamnian treasure-house at Olympia.

Greek sculpture moved with Myron into its classic period. There are six great names: Myron, Phidias, Praxiteles, Polykletos, Scopas, and Lysippus. With Myron, figures first began, in sculptural language, to move: the rigid stone and bronze expressed full movement. He knew the human form thoroughly; and in his realistic work gave movement and warmth to form. He was the greatest of the school of Aegina; his *Marsyas* in the Lateran, at Rome, and his *Discobolus* or discus-thrower in the Vatican, are among his better-known bronzes. Polykletos of Sicyon was almost as celebrated, with his colossal chryselephantine statue of Hera in her temple at Argos, and other well known pieces. He is called the "man of measure": he made the sculptural canon, or figure of perfect human proportions. His art was somewhat mechanical, cold, and academic; yet his *Diana* was a wonderful achievement. Among the great Grecian products of this time is the *Nike Aptere* (the Wingless Victory) from the Acropolis or citadel of Athens; and also the sculptures upon the Parthenon, or temple to the virgin Athena. The exquisite friezes from this were brought to England by Lord Elgin in 1816, after centuries of vandalism committed upon them by barbarous Greeks, Turks, Christians, and pagans. Even more important than the friezes was the sculpture upon the pediments of the same building; these being sculptures in the round, or full three-dimensioned figures, which are finer work than the bas-reliefs. This belonged to the school of the great Phidias.

Phidias improved upon Myron; he ripened form in movement still further. He was the chosen sculptor of Pericles, and he himself made the chryselephantine Athena within the Parthenon, and the similar Zeus for the temple at Olympia. He was the climax of Greek sculptural development, both in movement and richness of form. With Myron, sculpture had been independent of architecture; Phidias related it, in the Parthenon and elsewhere, to the kindred art. The most beautiful surviving statue of antiquity, the Venus of Milo, cannot with certainty be ascribed to any individual sculptor, but clearly dates from this period.

After Phidias, the most important sculptor was Praxiteles, author of the nude Venus of Cnidos, which enraptured the ancient world, but has been lost for centuries. He was slightly more decadent than Phidias, forsaking architecture to concentrate on the beauty of the female form. His nudes were softer, prettier, less sculptural and architectural, than those of his immediate forerunner. Lysippus, in the Peloponessus, did splendid nudes, and also founded a school of portrait sculpture. His work, like that of Scopas, was divorced from architecture; he is noted for his figures of exquisitely proportioned athletes. Scopas excelled in the intensity of expression of his figures, and in their dramatic attitudes. His work was soulful, intense, and warm. With him, classic Greek sculpture came to an end.

After this time, the immense serenity of classic art was replaced by a loss of pure form and ideal beauty. The Rhodian school produced the poignant decadent Laocoon group, of a man and his two sons struggling in the grasp of vast snakes—expressing physical pain better than any existing group of statuary, and yet as a whole baroque, or overdone. With the decline in Pergamum, Grecian sculpture came to an end.

Etruria commenced with bas-reliefs similar to Assyrian art; Rome merely copied Greece, preserving such marvelous works as a cast of the Apollo Belvedere. There are noted sarcophagi of this period, one memorable one of a square-shouldered husband, heavily bearded, holding his wife in his arms. The emperors encouraged Roman sculpture, especially since its exponents immortalized the Roman rulers by petrifying them into marble. There are exquisite stone figures of the Tiber and the Nile, as old men with long beards, and a lovely group of Cupid and Psyche. The portraits possess some strength. Altogether, sculpture, for all its imitative and uninspired nature, had not entirely lost its vigor in the martial trampling down of the known world. Especially in the triumphal arches, memorable work in relief is found.

SCULPTURE DURING THE RENAISSANCE

The catacombs contain the first traces of Christian sculpture. No image of Christ is known before the time of Alexander Severus, about 230 A.D.; but a large bronze figure of St. Peter in St. Peter's Cathedral, Rome, dates from this period. The sarcophagus of Junius Bassus in the vault of St. Peter's dates from 359 A.D., and is an excellent example of bas-relief. Sixth century sarcophagi are more frequent.

After a fallow period of half a dozen centuries, Romanesque art developed in the 11th century, partly to replace the magnificent works of antiquity that the ruthless Christian piety had destroyed. Both this and the succeeding Gothic were expressionistic, embodying ideas rather than form. They were truly Christian carvings, rather than sculpture, expressing always some element of Christian faith. A reliquary of Henry I in the Castle Church of Quedlinburg shows the three Marys at the feet of Christ, all done in a rude and unconvincing style. By the next century, the Teutonic artists had begun to emerge from the darkest of the dark, artless ages. In the 12th century, sculpture began to take its place again beside architecture. Germany took the lead in this, Westphalia, Saxony, and Bavaria still containing many fine examples of this period. Bronze casting improved with stone cutting; and the example of Germany was soon followed by France. The west front of the Cathedral of Chartres is an excellent example of the late Romanesque in France. Italy lagged behind the two other countries.

The Gothic period caused a new awakening in expressionistic sculpture. Hardly a cathedral dating from this period lacks some excellent examples of carving, to foil the Gothic beauty of the structure. About 1350 flourished the sculptor Sebald Schonhofer of Nuremberg, to whom are ascribed the *Beautiful Fountain* of Nuremberg, and the sculptures of the Frauen Kirche.

Italy awoke in the persons of Niccolo Pisano and his son, who were of the Italian Gothic school. The father easily excelled all his contemporaries: he was architect, sculptor, and painter; but sculptor first. Five cathedrals attest his excellence. Giovanni Pisano, son of Niccolo, introduced a realistic note into sculpture; his *Madonna del Fiore* of Florence Cathedral is an excellent example of dignity in stone.

The Renaissance now broke over Italy; and Lorenzo Ghiberti (1381–1445) excelled all his rivals at first. He did the bronze doors of the Duomo, in Florence, excellent low reliefs, succeeding in putting four and five planes of distance into the reliefs; although this is not in essence good sculpture. Andrea Verrochio is noted for a splendid equestrian statue. Donatello, or Donato (1386–1468) was famous for his work in low relief; his equestrian statue of General Gatta Melata, and groups in a Florence cathedral, are noteworthy. Another Florentine, Luca della Robbia (1400–1481) flourished at this period, credited with the invention of enamelling terra cotta. Many Florentines did excellent portraits in stone; and Mino la Fiesole was especially important in this field. The Venetian school produced Bartolommeo Buono, the Lombardi, and Alessandro Leopardo, who gave the city the monuments of the doges, in the church of San Giovanni e Paolo.

In the Florence of the 16th century, Leonardo da Vinci and Michael Angelo Buonarroti gave the city preeminence over all Italy. Da Vinci was not primarily a sculptor; his equestrian statue of Sforza, his chief work in this field, has been destroyed. Michael Angelo (1494–1564) gave Italy her finest masterpieces of modern sculpture, and influenced all the arts. His knowledge of anatomy was tremendous. His *Moses* and *David,* effective though they are in the eyes of tourists, are not his best work. This appears in his tombs of the Medici and of Julius II. The latter contains many figures of slaves, left unfinished: cut into big blocks of marble, restless, twisted, tortured. An unfinished small Apollo is also magnificent. Benevenuto Cellini (1500–1572), Florentine also, excelled as the greatest metal-caster of modern times; his gold work, his vast Diana and his Perseus are highly impressive. A later sculptor, Antonio Canova (1747–1822) belonged to the neo-classical school. His work imitated the Greeks without understanding; he succeeded more often in copying the faults of the classic masters than their successes. With his tremendous second rate output, the story of Italian sculpture is practically at an end.

In France, the chief sculptors of the 16th century were Michael Colombe (1431–1514) and Jean Juste. The restorers of French sculpture were Jean Foujon (1530–1572), Jean Cousin (1501–1590), and Germain Pilom (1515–1590), whose work descended to exquisite human beauty, rather than idealized divinity. Spain, the Netherlands, and Germany possessed few sculptors of ability during this period; although in carvings Germany was preeminent. Adam Krafft of Nuremberg (1430–1507) was memorable for the vibrant expression of his figures.

Foremost among the followers of the neo-classicist, Canova, was the Dane, Thorwaldsen (1770–1844), who produced a large number of statues and bas-reliefs. His subjects were taken both from pagan and Christian legends; his most celebrated work is the *Dying Lion* at Lucerne, although the Schiller monument at Stuttgart is also memorable. Like Canova, his work has the faults of the Greeks, more often than their virtues. Dannecker (1758–1844) is also excellent in portrait statues, especially in female figures. Gottfried Schadow (1764–1850) of Berlin returned toward the realistic school; his follower, Christian Rauch, also of Berlin (1774–1857), combined this with the antique; town after town in Germany exhibits his skill. Ernest Rietschel of Dresden (1804–1861), A. Kiss (1802–1865), and Ludwig Schwanthaler (1802–1848) also deserve mention; although critics say that all of these since Thorwaldsen are, not sculptors, but modellers.

THE HOUR OF RODIN

In France, Chaudet (1810–1865), a classicist, and Pierre Jean David of Angers (1795–1856), a realist, did distinguished work. Constantin Meunier has done interesting work upon proletarian themes. Jules Dalou (1838–1902) expresses in a dignified way the strivings of social classes; and Albert Bartholmé, with some equipment of genius, has aided in liberating the art of modern Europe. It is in the person of Auguste Rodin that the revival of true sculpture began.

Rodin went back to the ancients. He studied the Greeks most of all, and understood form as they understood it. In concept, he was somewhat literary, as when he did the *Doors of Hell.* He became too expressionistic in theme; he forgot form and beauty, in his driving desire to express the human drama. His best work is the *Age of Bronze,* and his wonderful busts, perhaps half a dozen of them reaching supreme excellence, up to the early Greek work. His best known work, *The Thinker,* is not among his greatest pieces, being impressionistic and a trifle overdone. One famous group, *The Kiss,* is far greater, a life-sized example of pure beauty of form. He is the first modern man to understand living form. Toward his death, his work became decadent, and intimately soft; he forgot Greece for bourgeois racial pettinesses.

In England, sculpture dates back to the Roman occupation; and, indeed, before this, in the form of the strangely carved stones which abound in the Isle of Man, Wales, Ireland, and Scotland, the products of Celtic or pre-Celtic inhabitants. Little of Anglo-Saxon sculptural work has survived; many stolid effigies mark the earlier centuries after the Norman conquest. The first outstanding figure in England is John Flaxman (1755–1826); many English cities take pride in his varied works. Sir Richard Westmacott (1799–1856) was a worthy practitioner, and there have been many more down to the present vogue of the eccentric Jacob Epstein, who follows the swamplight of impressionism to impressive failure. In general, England has never produced a sculptor.

American sculpture was merely a chronicle of such names as Patience Wright (1725–1785) and Hezekiah Augur (1791–1858), down to the time of Augustus St. Gaudens. His baroque statues of General Sherman and of Farragut, in New York City, are his best known works. Daniel Chester French and Alexander Stirling Calder are among the most popular sculptors of the present day; Frederick Macmonnies is far better in his achievement. George Gray Barnard has done some distinguished work. The hope of America is in a group of young sculptors, Arthur Lee, whose splendid *Torso* (of a woman), in the Metropolitan Museum, has dignity and strength; Cecil Howard, a young American now living in Paris; Mahonri Young; and Antonio Salemme, whose impressive nude portrait of Paul Robeson, and half a dozen other pieces, stem out of classic Greek art with keen understanding and power. Aristide Maillol is the greatest living Belgian sculptor, with a simplicity and beauty of pure form, yet lacking an abiding sincerity.

THE LEADING ART MUSEUMS OF THE WORLD

Below are listed the leading art museums of the world, with what they are noted for.

Italy. In Rome, the Vatican Museum, noted for Egyptian, Greek, and Roman sculpture; the Capitoline Museum, and the National Museum located in the Baths of Diocletian, both for sculpture. At Naples, The Museum, with its collection of antique sculpture, especially from Pompeii. In Florence are the Uffizi Galleries, with a splendid collection of paintings, especially of Italian primitives.

France. In Paris are the Louvre, containing as major piece the Victory of Samothrace, of the period of Phidias; and the Luxembourg, especially noted for its modern painting.

Germany. In Berlin is the Kaiser Friedrich Museum, with a splendid collection of antique paintings and sculptures.

Spain. In Madrid is El Prado, noted especially for its collection of the paintings of Velasquez and Goya.

Russia. The Palace of the Invalides, at Leningrad (Petrograd), has an outstanding collection of antique sculpture.

England. In London, the British Museum holds many noteworthy objects, none greater than the Elgin marbles from the Parthenon at Athens.

The United States. The Metropolitan Museum in New York City has a balanced collection of paintings, sculpture, and splendid old tapestries.

III. ARCHITECTURE

BEGINNING OF ART IN BUILDING

Architecture is defined as that shaping art, of which the function is to express and arouse emotion by combinations of ordered and decorated form. Architecture in the West first appears as an art in Egypt. Its two divisions here may be roughly described as the pyramid age, when the capital was at Memphis; and the age of the temples, when the capital was at Thebes. The pyramids are among the oldest monuments in the world, and date from about 3000 B.C. They consist of vast conical masses of masonry, raised over a small tomb containing the sarcophagus of the pharaoh or monarch. The three great pyramids are at Ghizeh, a village near Cairo; and, according to the inscriptions, they were erected by Cheops or Khufu, Kephrem or Suphis II, and Menkara.

The height of the oldest, the Great Pyramid, was 480 feet 9 inches, and its base was 764 feet square, covering 13 acres. The second was 450 feet high, with a base 707 feet square; the third, merely 218 feet high by 354 feet square. Man still marvels as to how the pharaohs could achieve such immense undertakings, in the young state of man's engineering knowledge. The method must have been a combination of unlimited slave power, with the stone moved along mounds of sand. Herodotus tells, his information being based on subsequent stories, that the Great Pyramid required 30 years to build, with three months' relays of 100,000 men at the task. More than 2,500,000 huge blocks of limestone went into this one building—more stone than has gone into any other building in the world.

These pyramids evolved in 2,000 years from a simple heap of sand over a desert grave. The grave was first lined, below ground and above, with sun-baked bricks; then with stone; then the whole sand-heap was covered with stone. The next stage was the so-called step pyramid, the tomb of the pharaoh

Zoser, 200 feet high, consisting of a series of stone tomb-buildings one above the other, growing smaller symmetrically. The architect, Imhotep, may be hailed as the first great figure in architecture. From this, the transition to the pyramids at Ghizeh was easy.

The royal city of the living, built of bricks, has vanished; but the city of the dead, stretching southward from the Great Pyramid for more than 60 miles, still stares upward quietly at the hurrying stars.

Egyptian temples were at first tremendously massive, with great square pillars; soon graceful round pillars succeeded these, and grace became the keynote of the whole. The period of the empire was distinguished by the great hall at Karnak, the greatest colonnaded hall ever made by man. The central columns are 69 feet high; the capital at the top of each column is large enough to let 100 men stand upon it at the same time. This hall covered 88,000 square feet of ground. Tall obelisks, a whole avenue of lesser sphinxes, vast single stone statues of pharaohs nearly 100 feet high, which had to be transported for hundreds of miles across the desert—these were only a few of the glories of the Theban period. Discoveries are constantly being made, the tomb of Tutenkhamon (about 1350 B.C.) being the latest to yield its riches. One whole tomb, that of Perneb, has been removed, stone by stone, to the Metropolitan Museum in New York City. Other great tombs, excavated from the living rock on the western Nile plain, are as memorable as these structures.

Egypt built with stone; Babylon, having no stone, built with sun-dried bricks. Today, the tremendous architectural marvels of Babylon are huge formless mounds of sand on the plain. Such Babylonian marvels of antiquity as the eight-terraced tower of Bel, and the famous hanging gardens of Semiramis, remain as dim as legends today. Similarly, the Hebrew emperor Solomon employed the Phoenicians to build his temple at Semiramis; and they made temple and pillars of the cedars of Lebanon, highly waxed and inlaid with gold and jewels. The torch of an enemy ended this, when, if it had been of stone, it would still call pilgrims from every land. Assyria, which overran the Babylonian river valleys, was itself a country full of stone; but, by man's crippling imitativeness, the Assyrians used, not stone, but the Babylonian brick, for their temples and towers; and bricks, while they outlast men, die in the end.

Media and especially Persia were rocky hill lands; but they, too, learned architecture from Babylon, and theirs is gone today, except for such natural stone structures as the carved Behistun Rock. The various countries of Asia Minor had varying types of tombs; but all derived somehow from Egypt or Babylon. Lydia had the tumulus or mound, the one at Tantalais being 200 feet high; Phrygia's tombs excavated from rock cliffs, and Lycia's monuments imitating the wooden houses of the inhabitants, are noteworthy.

The earliest architectural remains in India are the Topes, or mounds, to preserve relics of Buddha and his followers. These are called Dagobas, and reach a height of 270 feet, as in the case of the Ruanwelle Dagoba in Ceylon. Another development was that of caves cut into the rock which became temples, as in the cave-temples of Ellora. Most impressive were the pagodas, conical pyramidal buildings of hewn stone of colossal sizes, elaborately ornamented. The pagodas of Mahavellipore and Juggernaut are excellent examples of this type of buildings. The later Moslems erected mosques of exquisite proportions and beauty. Of these, the Taj Mahal, erected by the emperor Shah Jahan (A.D. 1632) at Agra, as a tomb for his favorite wife, is the most splendidly poetic building in the world. The great central white marble dome is surrounded by four lesser domes of the same material; and four tall minarets, also of white marble, rise at the four corners. In color and design the building ranks first in the world for purely decorative workmanship; it is a dream in white marble.

In the Americas, the northern continent contains only rude monuments, as examples of the architecture of its primitive inhabitants. Peru has more remarkable monuments, dating before the period of the Incas. The ruins of Tita-Huanca, on the shores of Lake Titicaca, have vast monolithic or single-stone doors, and immense masses of masonry. The ruins of Cuzco, the old capital, are splendid examples of limestone construction. In Central America, Mexico, Yucatan, and Guatamala, remarkable remains are found. These are attributed to the Toltecs, a race which preceded the Aztecs. The teocallis, or houses of god, and the royal palaces, are especially worthy of mention. The pyramid of Cholula, near Mexico City, is the largest and most celebrated of the teocallis, measuring 1,400 feet each way, and rising 177 feet. Yucatan has many impressive ancient buildings, of Toltec or Maya workmanship, in a high state of preservation.

GRECIAN ARCHITECTURE

The Ægean period of Grecian culture, centered around the island of Crete, received its architecture from Egypt, with many local modifications. The great palace at Cnossos, the castles and palaces of Tiryns and Mycenae on the mainland, especially the Lion Gate of the latter castle, are almost 4,000 years old, and are still memorable. Classic Greek art developed three forms or orders of architecture—the Doric, the Ionic, and the Corinthian. The Doric, the simplest of all, had a simple fluted column, with a square capital above; its effect was massive simplicity. The Ionic had a slenderer column, with curved volutes in the capital, conventionalized from Egyptian lily-petals. The Corinthian, the most elaborate of the three, had a conventionalized acanthus-leaf pattern at the top.

The buildings on the Acropolis or fortress at Athens were collectively the most impressive throughout all Hellas. The noble Parthenon, a temple dedicated to the virgin (parthene) Athena; the temples of the Wingless Victory, of Theseus, and the Erectheion, to an ancient legendary king,—these composed a group forever memorable. Egypt and the Oriental nations had sought to catch the sublime in the vastness and massiveness of their buildings; Greece produced a solemn grandeur and beauty by perfection of proportion and purity of outline. The typical Greek temple is a parallelogram, with columns at both ends or all around; the earliest form had columns only in front. The temple itself was always a small enclosure within the vast portico.

Among the most impressive remains throughout the rest of Greece are the Doric buildings in Sicily and at Paestum, in southern Italy. The temple of Poseidon or Neptune, at Paestum, is the most perfect and best preserved of all the relics of classic antiquity. Ephesus in Asia Minor has merely the remains of the famous marble temple of Artemis or Diana, once called one of the seven wonders of the world.

ARCHITECTURE IN ITALY

Etruscan architecture is represented in the great Cloaca Maxima or great sewer at Rome, and in the hewn tombs throughout Etruscan Italy. Rome borrowed from Etruria the arch or vaulted roof, and from Greece the Corinthian order of architecture, modifying this slightly into the Roman order, by adding the parallel scrolls or volutes, taken from the Ionic column, at the top of the acanthus leaf pattern of the Corinthian. From great stone roads, aqueducts, and theatres, Rome progressed to the Pantheon or temple of all the gods, located at Rome, and built by Agrippa—a structure still magnificently imposing. The triumphal arches of Titus and Constantine have been the models for arches of triumph throughout the world. The great tomb of Hadrian, with a base 340 feet each way and 75 feet high, surmounted by a round tower 235 feet high, the whole crowned by a dome, is the greatest monument of the Roman ages.

Early Christian architecture began in the underground Catacombs, or burial and meeting places of the underground sect. For Christian temples of worship the Roman basilica or royal palace was used; out of this the cross-shaped churches and cathedrals came. The church of San Paulo at Rome, destroyed by fire in 1822; the old St. Peter's, dating from the time of Constantine; the small basilicas of Santa Agnese and San Lorenzo at the gates of Rome; and the church of St. Apollinaire at Classe, all date from the early Christian period.

When Islam overspread the southeastern crescent of the known world, a new style of architecture, the Arabesque, came into being. Its chief buildings were the mosques. The horseshoe arch, the chief mark of Moorish architecture, came in at this time; the stalactite ceiling became as distinctive as the Moorish arch. Egypt greatly improved the architecture of the mosques, and in Spain the art attained its highest beauty. The magnificent mosque of Cordova, commenced in 786, was the first of the great Spanish mosques. In 1248 the Moorish overlord of Seville commenced building the citadel of the Alhambra, upon a rocky crest overlooking Granada. This, with its imposing Court of the Fishpond and Court of the Lions, is the best known Moorish building in Spain. The Turks ennobled the mosques at Constantinople, although not departing from the architectural forms already there.

The first distinctive form of Christian architecture was that called the Romanesque, or debased Roman. The cross-like form of the foundation of the church or cathedral was retained, and such cathedrals as those of St. Godehard at Hildesheim and the Cathedral of Spires are splendid examples of this transition stage. When the Crusades opened eastern civilizations to the West, the definite Transition stage came in, marked by far more elaborate ornamentation. The gateway of the church of St. Yak, Hungary, is a fine type of this period. The great German cathedrals of Mayence and Worms may be regarded with that of Spires, all before the 12th century, as among the finest examples of Romanesque and Transition architecture in Europe.

The Italian cathedrals already show a budding of the later Byzantine architecture. The cathedral of Pisa, with its leaning tower or campanile, is typical of the best of this period, although this is definitely influenced by the oncoming Gothic. The cathedrals of Novara and Modena show almost a development into true Gothic (sometimes called "Pointed architecture"); they lack only the pointed arch and the window-tracery. During this same time was built the famous church of St. Mark's at Venice, a purely Byzantine building.

This type of architecture was that adopted by the Slavonic races of Europe, who followed the Greek Catholic Church rather than the Roman Catholic. Its chief type is the cupola or dome covering the central portion of the church, and the use of the arch in a bewildering multitude of forms. The interiors were richly decorated. Greater than the church of St. Vitale at Ravenna is the celebrated church of St. Sophia, in Constantinople, for centuries later that city's great mosque, and now, according to the latest reports, being used as a dance hall. Commenced by Justinian in 532, this was completed in six years. Its exterior is plain; its internal arrangements are of surpassing grandeur. The church proper is a vast square, 229 by 243 feet, surmounted by a dome 107 feet in diameter, rising 182 feet from the floor of the church. This is the finest specimen of Byzantine architecture extant. The form spread as far as Aix-la-Chapelle, whose cathedral, said to have been built by Charlemagne between 796 and 804, is pure Byzantine.

GOTHIC AND RENAISSANCE

Gothic or pointed architecture was the greatest flowering of the medieval spirit in this art. In place of the moderate slopes of classic buildings, we now have vertical and sharply-pointed features, gables, spires, buttresses, high-pitched roofs, with pointed arches, and the use of window tracery. High above are the endless intersecting lines of arches, meeting overhead like an avenue of trees; the inspiration of the architecture undoubtedly deriving from the great high-arched forests of northern Europe. The interior of the Gothic is decorated as richly as the Byzantine. The magnificent cathedrals of Notre Dame in Paris, of Chartres, Rheims (partly destroyed in the World War of 1914), of Beauvais, Bourges, Amiens, and others in northern France, are the purest crystallizations of the pointed type. In Germany, the cathedrals of Magdeburg, Strasburg, and majestic Cologne represent this order of architecture.

In the Netherlands, the chief Gothic buildings are the great town halls. Those of Ypres, Bruges, Brussels, Louvain, and Ghent, which survived the World War, are especially noteworthy today. Italy has its cathedrals of Florence, Milan, Sienna, and Orvieto, besides many lesser buildings. Spain's cathedrals of Burgos, Toledo, Seville, Tarragona, Barcelona, Leon, and others, are also splendidly conceived and erected.

After the Gothic came the Renaissance, originating in Italy as a revival of Roman architecture. The Florentine, Roman, and Venetian types of this are distinguished by specialists. The great palaces of Florence are exquisite examples of the first of these. Rome's Cancellaria, Farnesina palace, and the Palazzo Pandolfini at Florence, mark the second stage of the Italian Renaissance. Michael Angelo's work upon the completion of St. Peter's marks him as one of the great world architects.

LATER ARCHITECTURE

This style was succeeded by the Baroque or quaint style, with a riot of capricious and unmeaning decorations. France received the new mood later than Italy; the palace of Fontainebleu, combining Gothic and Italian features, and the exquisite west front of the Louvre, erected in 1541, being outstanding examples. The revival of classic influence is reflected in such handsome structures as the Invalides and the Pantheon in Paris. The last and most extravagant form of the Renaissance architecture is often called the Rococo.

After the severe Anglo-Saxon style in England, the Norman order of architecture came in, a heavy-set precursor of the Gothic. The cathedrals of Canterbury, Rochester, Chichester, and Norwich are good examples of this, as well as the Tower of London, and the castles of Dover, Windsor, Warwick, and many others. Gothic architecture is exemplified in the cathedrals of Salisbury, Winchester, Chester, and elsewhere. In England, the Transitional style is divided into Elizabethan and Jacobean. The most accomplished architect of this Renaissance style in England was Inigo Jones, whose St. Paul's in Covent Garden is his most successful structure. Sir Christopher Wren, the great restorer of English buildings after the Great Fire of 1666, was also noteworthy for his assiduous attempts.

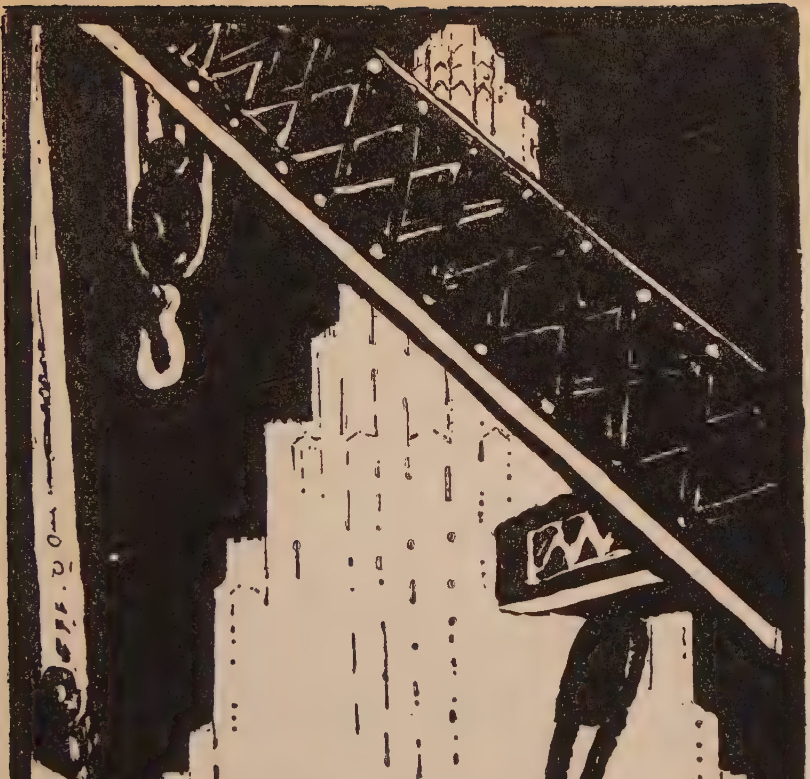
The most important development in architecture since the

Gothic is the recent flowering of tall towered buildings in the United States, especially the step-back or pyramided towers required by the municipal enactments of New York City, to permit natural daylight in the canyoned streets far below. Such early buildings as the Flatiron, the Metropolitan Tower, the Singer Building, and the Gothic-based Woolworth Tower, lack wholly the grace of more modern buildings like the American Radiator Building, the Shelton Hotel, the New York Telephone Building, the new Carleton Towers, and a score of pyramided structures forming the enchanting skyline of the American metropolis.

The architecture of the ancient world was a memorial to the dead; that of Greece and the medieval ages, a dwelling place or place of worship for the gods; that of today, a home for the industries of the living; or, as some cynic has worded it, a tomb for the living dead. The effect of sky-aspiring majesty is as present in these lean, lovely towers as in the slimmest Theban obelisk or the loftiest Gothic spire.

CABINET-MAKING AND FURNITURE

Out of this step-back American architecture has evolved a new furniture, a furniture which owes nothing to its predecessors except the incidental article names that the pieces bear. Furniture, in a very real sense, is a subsidiary form of architecture. It came into being with the development of the building of houses, and borrowed its lines from the prevailing architectural mode. Until the close of the middle ages, there was practically no furniture. The four types of furniture—table, couch or bed, chair, and chest or chest of drawers—nevertheless are rooted deep in the past. Among savages, any handy rock boulder served as a table; the couch was the ground; the loftiest rock in the council place was the king's seat, or throne. When the chest developed, as its lines indicate, it came from the sarcophagus or coffin. The earliest of these sarcophagi, in Egypt, followed the curves of the human body; later, they became oblong boxes of granite or wood. From these, the chest developed, mainly during the middle ages; and the chest of drawers may have come from the habit



Louis Bromberg

Only to the girdered steel
Will man's highest vision kneel;
Only sweat and strain and dearth
Can grow Paradise on earth.

of shelving coffins in the catacombs and other places of general entombment.

The table, the couch, the chest, and the throne chair were the entire furniture of all the early peoples. The Ptolemies were as well lodged as the Plantagenets. The great Roman palaces were largely unfurnished—merely great successions of halls, with wall paintings and sculpture, and a few tables and couches (borrowed from the Greeks) on which the Roman lords reclined at meals, a luxurious supplanter of earlier low benches. Only the wealthy in the early civilizations, as when our own was dawning, had any household furnishings. No person of low degree could have obtained, or would have dared to use if he could, what is now the commonest object is every Occidental household—the chair. We are too used to taking such casual things as chairs and chests as a matter of course, unaware of the tardy laborious human inventiveness involved in them. As civilizations founded upon slavery yielded slowly to the more democratic ones, furniture became a household necessity.

We have very few examples of the furniture of the ancient cultures. What we have, ancient thrones, seats, and chests, reflects the architecture of the times. These features became frequent in household equipment, at about the time that the pointed Gothic architecture swept Europe. We have the tall, stiff chairs whose backs mounted to cathedral spires, and furniture decorated with delicately carved gargoyles and scrolls, all borrowed from the great cathedrals. Unfurnished feudal castles prized their great tapestries; and, to render these safe in case of sudden flight made necessary by some raiding neighbor, the great chests developed, in which the tapestries and other possessions could be hastily crammed for quick transportation. These were heavy and cumbersome, resembling more sepulchral sarcophagi than modern furniture.

We do not know who designed and made these pieces. It was not until the 16th century that a cabinet-maker worthy of the name became known. There were doubtless many at this time, but the only one whose craft was sufficiently memorable to preserve the stamp of his name was a Frenchman, Andre Charles Boulle.

The 18th century is called the golden age of furniture. It was then that the English Heppelwhite, Sheraton, Chippendale, and Adams flourished. They offered nothing essentially new to their art. They merely simplified the models of the past, which in itself was a step forward. They repudiated the gilt paint and rococo carvings of the furniture of Louis XIV, XV, and XVI.

In America, the greatest cabinet maker of them all, Duncan Phyfe, followed their lead, and created the most surpassingly beautiful furniture of all time, down to the present. He modeled his furniture after the early American Colonial pieces, which were built for use, by crude workmen, who had neither time nor skill for carving and painting. Duncan Phyfe saw in this crude work the essentials of art, and on its principles built furniture in which almost every non-essential is eliminated.

This age of exquisite furniture was succeeded by the Empire period in France, and the Victorian era in England and America. In France there was no new architecture, so the cabinet-makers went back to the older ages and borrowed almost the worst from each, assembling clumsy over-decorated furniture that was a hodge-podge of all periods, and representative of none. In England and America, furniture met an equal fate. Here were produced the atrocities in American walnut which took their style from the Victorian architecture of the day, and were barnacled with futile carvings of wooden cherubs, and tortured into strange curves and angles.

During the past fifteen years, there has been a revival of interest in antique furniture. The cabinet-makers, taking their cue from feverish seekers of the furniture of other days, have been busily copying the styles of the 18th century. Until the present, there has never been a truly American furniture. Even Duncan Phyfe's art was not truly American, for he stemmed from the English cabinet-makers as well as from the early utilitarian American Colonial, itself deriving from English models.

Now, keeping pace with American architecture, and its amazing, eye-satisfying, step-back towers, Paul Frankl's work in cabinet-making appears. With an eye toward furniture's primary object, its usefulness, and a true sense of beauty, he has eliminated every non-essential line, and is producing a type of furniture which is at once luxuriously comfortable, restful, and completely satisfying to look upon. His bookcases and cabinets mount and recede as do the new skyscrapers, until a roof seems a sacrilege. His mirrors and chairs have the easy, simple sweep of great wheels; where he uses curves, they have the easy, simple sweep of pure machinery. He uses silver lacquer in a way that recalls steel girders and ball-bearings. We can gaze at a great machine for hours, although few understand why. This is because there are no useless appendages to harass the eye: every line, every curve, has its essential function. So it is with this new Frankl furniture. Its originator has created a new art, and has raised household decoration to a plane it has never before approximated.

THE WORLD'S GREATEST ARCHITECTURE

NEOLITHIC. The ruins of Stonehenge, in England.
EGYPT. The Great Pyramid of Ghizeh.
GREEK. The temple of Poseidon, at Paestum, Italy; the ruins of the Parthenon, on the Acropolis at Athens.
ROMAN. The Pantheon, at Rome.
BYZANTINE. The Mosque of St. Sophia, in Constantinople.
MOORISH. The Alhambra, in Spain.
ROMANESQUE. The Tower, Baptistry, and Cathedral of Pisa, Italy.
GOTHIC. The cathedral of Beauvais, France, and the ruins of the cathedral of Rheims.
HINDU. The Taj Mahal, at Agra.
BAROQUE. St. Peter's Cathedral, in Rome.
MODERN AMERICAN. The new Telephone Building, in New York City.

IV. DANCING

FOLK DANCING

Dancing is a wide term, used to include spontaneous muscular activity under the influence of strong emotion, as social joy or religious exaltation; definite combinations of graceful movements performed for the pleasure of the dancer or spectators; and carefully trained movements to represent in bodily movements the actions and emotions of other people. The first form of dancing, being purely spontaneous, is not an art form. Yet from this is derived the later forms.

It is a debated question whether the dance, or song, or poetry came first; or whether they came together, as a combined expression of group emotion cresting at last into the separate arts. Some joint origin of these arts is evidenced by facts gathered from all antiquity and from widely scattered modern neo-primitive races. The tribal "sing" of the African Hottentots combines improvised tribal dancing, singing, and folk-song creation; the earliest Negro folksongs and spirituals combined dancing, singing, and word improvisation. Every other culture has traces of the same grouping. The Abyssinians in Tigre dance the *chassée* step in a circle, keeping time by shrugging their shoulders and working their elbows backwards and forwards. The Bushmen dance in low-ceilinged rooms, supported by a stick and one motionless foot, while the other dances with wild irregularity. The hill Gonda of Hindustan dance in pairs, feet shuffling, eyes on the ground.

The national dance of the Kamchadale is the essence of violence, every muscle apparently quivering at every movement; the dance is a rude reproduction of sexual passion. Variations of the dance among Tasmanians, inhabitants of Yucatan, New Caledonians, Fijians, Javans, and Mexican natives all suggest the same thing; although there is always a mere pleasure in the double rotation of partners. Each trade among the Tahitans has its public trade dance. Instrumental accompaniment, even if only with the drum, and in general chanting, intoning, or some other forms of noise made by the dancers, is also general.

Throughout all the continents there are many dances illustrating the chase, the actions of wild beasts, mimic warfare; elements of these survive in the smooth ballroom dances of yesterday and today. Early mimetic or imitative dances also included the funeral dance, the consecration of labor, the celebration of harvest or vintage, and fictitious scenes of dramatic interest. There are also devil-dances by professional medicine men, to drive out the spirits of disease and ill fortune.

With this, we pass to the vast field of the religious dance. Such dances expressed thanksgiving, praise, supplication, and also humiliation. David's dancing before the ark, and the custom of the Roman priests, the Salii, of dancing while they struck their shields, led to the early Christian custom of dancing during the service, with special room provided for this in the choir; and down to the use of rhythmic dancing in isolated modern Christian churches, such as St. Mark's-in-the-Bouwerie, in New York City.

Dancing fell into Christian discredit with the *agapae,* or love-feasts. Many Christian reforming sects, such as the Albigenses, the Waldenses, and the modern Methodists, reacted vigorously against religious and secular dancing, and prohibited all forms of the art. Yet as late as the end of the 18th century there were traces of religious dancing in various cathedrals in Spain.

Among the famous dances of classical Greece were the pyrrhic, the Bacchanalia, and the Hymenaea. Dances formed regular interludes in the formal Athenian drama, including the ancient *Geranos,* named from its resemblance to a flight of cranes; and the powerful dance of the Eumenides, or Furies. In Augustan Rome, Pylades and Bathyllus brought serious and comic pantomime dancing to great perfection. The themes were such as the labors of Hercules, and the surprise of Venus with Mars by Vulcan. For a time the imperial Roman dances supplanted the drama in popular esteem. In the end, their art vanished in the general decay of the Roman empire.

MODERN DANCING

Fifteenth century Italy saw the renaissance of dancing, although France is the nursery of the modern art. Few dances originated in France; but this land took the national dances of other countries, studied them, and perfected them. The 16th century saw the *danses basses* and *dances hautes,* the first solemn and popular at court, the second skipping and in favor among clowns and country people. The lively *Gaillarde* and *Volta* were brought by Catherine de' Medici into France from Italy, to startle with their spectacular beauty; more popular was the *Branle* (afterwards corrupted to *Braule,* and known in England as the *Brawle*), a dance-type susceptible of infinite variety, and akin to the once-popular *Allemande.* The most formal and stately dance of the period was the *Pavane,* originating in Spain, embodying a stately procession of gorgeously dressed gentlemen and ladies. In both *Pavane* and *Branle* kissing formed an important part. The Spanish *Saraband* enjoyed a brief popularity, and was followed by the *Courante,* a court dance performed on tiptoe, with slightly jumping steps, and many curtseys. This was akin to the Spanish *Seguidilla,* and was largely the ancestor of both waltz and minuet.

The dance which France brought to the peak of perfection, regarded by many as the flower of the art, was the minuet. Originally a rustic *Branle* derived from the *Courante,* from the neighborhood of Poitou, it reached Paris in 1650, gay and lively, and restricted at first to two persons in moderate triple time, ordinarily followed by a gavotte. Afterwards it became highly developed into the stage display form it has today. The gavotte, too, had originated as a peasant's dance, a combination of kissing and capering. This and the minuet were elaborated into a courteous satiny ritual. France also adapted, at about the same time, the *Cotillon,* a peasant dance, the German *Galop,* the invented *Lancers,* the Bohemian *Polka* and *Schottische,* the *Quadrille,* and the waltz.

Spain is the true home of many modern dances, as a physical expression of the gay-hearted people. In the 18th century the earlier dances were replaced by the famous *Bolero, Seguidilla,* and the *Fandango.* The last mentioned two of these include a sudden pause of the music toward the end of each measure, upon which the dancers stand poised as if frozen to marble. The click of the castanets, the snapping of fingers, the stamping of feet, increase in speed with the dancing, until a whirl of exaltation is reached. There are more than a dozen other important national Spanish dances.

England, in court dancing, followed France; but she still treasures the old folk dances, the Egg dance and the Carole (a Christmas dance, persisting in the singing of Christmas carols today). These two were of Saxon origin. The Morris dances, originally "Moorish dances," came in during the time of third Edward, and consisted of elaborate caperings around a May-pole, with performers belled at the knee, and at times attired as Robin Hood, Maid Marian, Friar Tuck, Little John, Tom the Piper, and other English folk worthies.

All English folk dances are founded on some variety of the jig; the hornpipe, a kind of jig, is the national dance of England. Many of these folk dances persist in games now sung and danced by children, such as "Here we go round the Mulberry Bush." During the Tudor period, the Cushion dance and most of the rest were essentially kissing games. More than a score of these dances are known, which of course suffered a distinct eclipse during the rigorous Puritan period. During the reign of Queen Anne, Beau Nash revived the system of elaborate formal balls, with formal French dances supplanting the natural English ones.

The only true national dances of Scotland are reels, strathspreys, and flings. Ireland has only the jig; Wales has no national dance whatever.

A score of years ago, the waltz and the two-step filled dance programs. In spite of the vast variety of American Indian dances, ranging from sex dances through the chase and war to invocation of tutelary spirits to control rain or other natural phenomena, these have not affected American popular dancing. The celebrated folk dances of Russia and the Slavic nations are sometimes given as solo dances, but have not achieved popularity among native Americans. More than a dozen years ago, the great vogue of dances derived from Negro folk dances commenced. These included the tango, invented by Cuban Negroes and received through the Argentine; the cake-walk, bombershay, turkey-trot, Charleston, black bottom, messing around, the shimmy, balling the jack, and countless more. The one-step and fox-trot are the most popular ballroom dances today, with periodic recrudescences of the waltz. The Washington Post and the barn dance are also distinctively American in origin, although of an earlier date.

The modern ballet was first produced on a considerable scale in 1489 at Tortona, before the Duke of Milan. It reached France with Catherine de' Medici. This form of art attained high development, especially in Russia; and the Russian ballet has not only produced distinguished individual ballet dancers, but has toured the world triumphantly with its whole corps of ballet performers. Masked balls have been known in Europe since the 17th century. A splendid development has taken place recently in modern rhythmic or interpretative dances, perhaps the highest art form of the dance. Isadora Duncan is the leader of the world in this art form, which stems obscurely but certainly out of Greek dancing.

V. Music

THE ORIGIN OF MUSIC

Sound is the principal medium by which the higher animals express and excite emotion; and music, or sound indulged in for its own attractiveness, far preceded man's creation of a spoken language. Yet primitive music for centuries lagged behind the other arts. Among the Greeks, the various scales were written downward, instead of upward; deriving their ideas of high notes and low notes from the position of the notes on their instruments. Musical scales are one of man's significant art inventions; and their development has been slow and gradual.

Oriental music, like ancient music and all non-European music, is still less an independent art than an adjunct of poetry or the dance. The modern European scale has only twelve intervals in an octave lying, for instance, between middle C and the C next higher on the piano; most Oriental music has many more intervals. This conceivably points to a greater sensitivity in the Oriental ear for music. A more probable explanation is the differing musical instruments dominant in the two cultures. Oriental music was probably based upon stringed instruments, like our violin, which permit an infinite number of intervals between C and the next higher C; and the Occidental music on instruments with stops, or stringed instruments like the harp, clavichord, and piano, which require definite intervals. Occidental music, to Oriental ears, at first consists merely of discords; the same is true of our early hearing of Oriental music. Familiarity and education in appreciation make both acceptable to any normal ear.

The interval of the downward fourth (from C to G) is believed to be the earliest melodic relationship which the ear learned to fix. Most primitive scales were formed by the addition of auxiliary notes at the bottom of this interval, and by the addition of a similar interval, with similar additions, below the former. In this way a pentatonic or five-toned scale, like that of so many Scotch melodies, can easily be formed: thus, C, A, G; F, D, C. Other primitive scales seem to have been based on the interval of a rising fifth; and the Oriental Siamese use two scales, of which not a single interval inside the octave can be accounted for on any known principle.

The Greeks divided their downward fourth into four notes, called a tetrachord; and by elaborately linking these tetrachords, they gave their scale a reach of two octaves. Of the three Greek methods, the most ancient, the enharmonic, used as a tetrachord:

C
A flat
a note between a flat and G, and
G.

The chromatic scale was

C
B double flat
A flat, and
G.

The diatonic, from which modern music sprang, was

C
B flat,
A flat, and
G.

When Pythagoras, in the 6th century B.C., discovered the simple mathematical proportions of these intervals, the survival of this scale as the chief Greek mode was assured.

Until the discovery of our modern harmonic sense, music could not rise to an independent height. Of the three elements interacting in music, rhythm, melody, and harmony, the first two are as ancient as human consciousness itself. With harmony, music assumes the existence of a kind of space in three dimensions, none of which can exist without implying the others. When we hear a melody without accompaniment, our musical sense at once fills it in with its most probable harmonies: thinking away our harmonic preconceptions is a tremendous feat of mental gymnastics. Two great German composers of operas, Glück and Wagner, fired by the fact that classic Greek drama was pervaded with music, the music to accompany Aeschylus being composed by the dramatist himself, thought that, in modern opera, they were reviving Greek tragedy. But the music of Greek tragedy was merely an organization of the rise and fall of the human voice, and not an independent art form.

Hebrew legend ascribed to Jubal, a descendant of Cain, the origin of the harp and the organ. The harp resembled the later lyre; the organ was probably a group of reeds played with the mouth. The Old Testament is full of musical references. The song of the triumph of Moses was accompanied by timbrels, or small instruments resembling tambourines, made of parchment stretched over hoops; the walls of Jericho fell down at the blast of the trumpets. The psalms were sung to the accompaniment of a harp or lyre, supposed to have consisted of twenty strings, each vibrating to only one tone; the dulcimer, a fifty-wired string instrument played by striking the strings with small rods or hammers; smaller dulcimers, called psalteries; cymbals, brass percussion instruments clanging when struck together; the sackbut, or trombone, a deep-toned double trumpet; and other instruments. The Egyptian paintings represent many persons with varied musical instruments, including harp, flute, the jingling sistrum, five and seven-stringed lyres, drums, trumpets, tambourines, and cymbals.

Until the time of St. Ambrose (340–397 A.D.), sacred melodies were sung in unison (notes having the same pitch) or in octaves. Ambrose introduced the simple Ambrose chant, using the Greek diatonic tetrachord. Sixth century Gregory the Great added four other tones; the Gregorian chants were written on four lines only, a rudimentary form of the scale notation now used. Thirteenth century Guido of Arezzo, a Benedictine monk, is said to have invented the musical notation, taking the opening syllables of the first six lines of a hymn to St. John:

Ut queant laxis
Re-sonare fibris
Mi-ra gestorum
Fa-muli tuorum
Sol-ve polluti
La-bii reatum, etc.

Guido added *si* to represent the seventh note in the scale; and, after the change of *ut* to *do,* these seven syllables, called the *Solfeggio,* have formed the basis of methods of teaching singing. In the key of C, these notes are C, D, E, F, G, A, B; but they may be applied to any key, with *do* always representing the key-note.

The aristocratic troubadours, or trouvères, of the 12th and 13th centuries, paved the way for the famous English song, *Sumer is icumen in,* a 13th century round in four parts. The music of Adam de la Hale (1230–1288) shows the transformation of the troubadour into the learned musician; and by 1437 an Englishman, John Dunstable, made great progress in counterpoint. Franco of Cologne, flourishing in the 13th century or earlier, was the first to indicate the duration in notes by different symbols, as well as to devise signs for sharps, flats, and the division of the composition into bars.

THE GOLDEN AGE OF MUSIC

It was in the Netherlands that the shackles of scholastic conventionalism were first thrown off, paving the way for the golden age of music. Josquin des Prés, Dufay, and Okeghem or Okenheim, of the 15th century, are usually spoken of as the pioneers of the science of counterpoint—so called because it was originally written in points or dots placed opposite each other. The first really sublime masterpiece in music is Josquin's *Miserere,* now accessible in a modern edition. Greater than any of these was Orlando Lasso, of Mons, in Hainault (1520–1594), who astonished all Europe with his magnificent compositions in counterpoint. He was the last of the great Flemish masters; the scepter passed at once to Italy, and then to Germany.

Giovanni Pierluigi da Palestrina (1524–1594) was the first great Italian innovator in modern music. At an hour when Pope Marcellus II had determined to discontinue music in church services, Palestrina's splendid *Mass of Marcellus,* for six voices, turned the tide against songlessness. His works combined musical science with musical art, giving him an especial significance in the history of the development of music. His successor, Gregorio Allegri (1560–1662), whose *Miserere* for two choirs, of four and five voices respectively, is still sung in the Sistine Chapel during Passion Week, was a worthy follower of the great originator. The Spaniard, Thomas Louis de Vittoria (1540–1608) also wrote memorable masses for choirs without accompaniment, which are still highly impressive. St. Filippo Neri, in the 16th century, produced the first oratorio; Alessandro Stradella, in the 17th century, contributed further to the development of this form of composition. Stradella's romantic love episode with a Venetian girl loved by a nobleman, consisting in their flight through Europe pursued by hired assassins of the nobleman, and culminating in the murder of the unhappy pair at Genoa, is cherished by all lovers of music.

The first secular opera is the comic *La Gieus de Robin et de Marian* by the Belgian Adam de la Hale, already referred to. In the 16th century the second opera, *Dafne,* by the poet Rinucci, set to music by Peri, appeared, together with the tragedy *La Morte di Euridice,* by the same authors. Claudio Monteverde (1568–1643), a Florentine seeking to revive Greek drama, composed his *Orfeo,* requiring an orchestra of thirty-six performers. Thus Italian opera commenced.

The end of the 17th century saw music in full swing in Italy. Alessandro Scarlatti (1683–1720) was the forerunner of Handel. His opera *Teodora* was the first with recitatives sung to orchestral accompaniment; he wrote altogether 117 operas, beside many lesser pieces. Durante (1684–1755), his pupil, was a notable composer of sacred music. Among other noteworthy Italians of the period were Gallupi (1703–1785) and Giambattista Pergolesi (1710–1736), last great composer of sacred music in Italy, whose death marked the decline of Italian music. Pergolesi struggled against classicism, and in his *Stabat Mater* he wrote music ranked among the greatest of all sacred compositions. Piccini (1728–1800), unsuccessful rival of Glück, still ranks high among operatic composers, as does Cimarosa (1753–1801).

The famous family of Antignati, in Brescia, stands out as organ-builders; the violin was brought to perfection by Amati of Cremona and the greater Stradivarius, in the 17th century. France, during the 17th and 18th centuries, had many noted composers, preeminent among them Lalande (1657–1726) and Rameau (1683–1764).

The close of the 17th century witnessed in Germany the birth of two of the world's masters of music, John Sebastian Bach (1685–1750) and George Friedrich Handel (1685–1759). Bach, greatest of a family of musicians, was made court organist to the Duke of Weimar at an early age, and was the darling of many rulers. Too close application to study resulted in the loss of his eyesight; and an unsuccessful operation on his eyes hastened his death. His works are all on sacred themes, and are written chiefly for the organ. But for Handel, he has no rival in this form of composition. His majestic *Passion Music,* an oratorio for two choirs and two orchestras, is one of the most wonderful musical creations in existence; his cantatas and oratorios are remarkable for the invariable solemn grandeur of their style.

Handel is the great master of oratorio. Much of his life was spent in England; here many of his greater operas were written; and here blindness fell upon him toward his death. His *Israel In Egypt,* and *The Messiah* are regarded as the finest works of the oratorio class ever composed. Christoph Ritter von Glück (1714–1787), the father of modern opera, after studying Italian models assiduously, and after important early attempts, composed his *Alceste, Paride e Elena,* and *Orfeo,* in which his noble and exalted style was fully exhibited. His *Iphegenia in Aulis,* first given in 1774 in Paris, was produced 170 times in two years; the unexpected unpopularity of his *Echo and Narcissus* sent him into a retirement in Vienna, where he died as a result of apoplexy, after seven years of inactivity. He restricted music to its proper function of ministering to the expression of poetry, without interrupting the action.

Francis Joseph Haydn (1732–1809), creator of the modern symphony, after thirty years of splendid production in Austria-Hungary, removed to England, and between 1791 and 1794 produced his twelve grand symphonies, all of which were first given at the Haymarket. After his retirement to Venice he composed his exquisite oratorio, *The Creation,* and lived out to the ripe age of seventy-seven. His works number more than 800, including 118 symphonies, 84 quartets, 5 oratorios, and 44 sonatas. His work in the quartets, which best illustrate the evolution of his genius, has never been surpassed in this form. His symphonies show a parallel development; and the greatest of these rank with the best of Mozart, Beethoven, and Mendelssohn, the other supreme masters in this field.

Johann Wolfgang Amadeus Mozart (1756–1791), a man of universal genius, and one of the world's greatest composers, commenced his compositions at the age of four. At the age of six he and his sister played to audiences in Munich and Vienna, to great applause. His opera of *Idomeneo,* composed when he was twenty-four, marked an era in the history of music; his *Nozze di Figaro* was quite as successful. Nine years later *Don Giovanni,* considered his masterpiece, appeared first in Prague, Bohemia, where his warmest admirers were. This is a marvelous expression in music of all the passions that agitate men. Toward the end of his brief life, *Il Flauto Magico* and the magnificent *Requiem Mass* appeared. In spite of his great reputation, he died poor.

Ludwig von Beethoven (1770–1827), perhaps the greatest master of pure music that the world has known, lived throughout a lonely and unhappy life. Son of a singer, in his youth he displayed a strange dislike of music; yet at the age of thirteen he published a volume of songs and sonatas which was very well received. The death of his patron, the Elector of Cologne, left him destitute at the age of thirty; and about this time that terrible affliction, deafness, which depressed the rest of his life, began to grow upon him. During the sad, toneless years his greatest works, which have thrilled thousands, were produced; but they were never heard, except in spirit, by their composer.

The works of his first period betray the influence of Haydn and Mozart, and show a high mastery of musical form; the great symphonies in C and D well illustrate this. The second period, from the 16th through the 80th choral work, was marked by an absence of outside influence, and the production of his most stupendous symphonies and overtures. The *Eroica* and *Pastoral* symphonies, and those in A major and C minor, as well as the opera *Fidelio* and the overture to *Egmont,* date from this era. In the final period came the mighty *Missa Solemnis* and the *Choral Symphony,* the ninth, in D minor, both of which surmount the laws of music with tremendous effectiveness.

The 19th century saw, in Germany, Franz Schubert (1797–1828), whose exquisite songs have rarely been surpassed. The *Erlkönig,* written in 1816, is one of the finest; and it is a strange eccentricity of genius that this was written while the composer was befuddled by drink, and was carelessly tossed by him at its completion into a wastepaper basket, from which some friend rescued it. Of his other compositions, the seventh and last symphony, the Quintett in C, and the Sonata in A minor, are preeminent. Passing by the lesser work of Ludwig Spohr, Carl Maria von Weber (1786–1826) composed splendid patriotic songs, vigorous cantatas, and the magnificent *Freischutz, Oberon,* and other masterpieces. The former of these operas placed Weber at once at the head of the writers of lyrical opera in Germany; the overture, summarizing in masterly fashion all of the opera's action, would be enough to make the reputation of any musician. Many of his lesser pieces, such as the rondo *Perpetuum mobile* (finale of his Sonata in C) and the Polonaise in E major, have profoundly influenced subsequent music.

Frederic Francis Chopin (1810–1849) was a native of Poland, and the founder of a new school of pianoforte music. He was the poet in pure sound; his nocturnes, valses, mazurkas, scherzos, combine an underbeat of sadness with a brilliant and playful fancy. Jacob Meyerbeer (1794–1864) was a musical prodigy in childhood, who gave his first concert at the age of six in Leipzig. He is best known for his operas *Robert le Diable, Les Hugenots, Le Prophéte, Dinorah,* and *L'Africaine.*

Felix Mendelssohn Bartholdy (1809–1849), son of a banker of Hamburg, delighted the world with his difficult quartetts at the age of fifteen. At nineteen, his overture to the *Midsummer Night's Dream* startled the musical world with delight. His music for Goethe's *Walpurgis Nacht* ranks among his masterpieces; the sublime oratorio *Elijah,* first produced in Birmingham, England, after nine years of laborious composition, embodies much of his life's energy. Inventor of the modern capriccio, his compositions, with Schumann's, were influential in the evolution of modern music. Robert Schumann (1810–1856), from Saxony, combined inventive and critical power in the highest degree; his symphonies, his cantata *Paradise and the Peri,* and many shorter pieces, including the exquisite songs, are among the crowns of recent compositions.

Richard Wagner, the world's premier master of opera, achieved the most monumental effects in music, aided by other arts, that man has yet reached. His tremendous *Ring of the Niebelungs,* his jolly *Meistersinger,* his *Lohengrin, Tannhauser,* and the impressive *Parsifal,* combined great innovation in the use of the apparent discord, with a dynamic and revolutionary philosophy of life. Few musicians have evoked such a storm of criticism as his radical novelties in the art; the storm has subsided, and Wagner now sits among the few supreme masters.

In the same period Franz Liszt was ranked beside the great composer of operas; today recoils somewhat from Liszt's excessive ornamentation, his baroque embroideries in tone. His brilliant successor, Richard Strauss, marks the transition into the radical music of today. Much more backward-looking was the perfection of Brahms; yet his art is imperishable, and he ranks high among the princes of pure song.

RECENT MUSIC

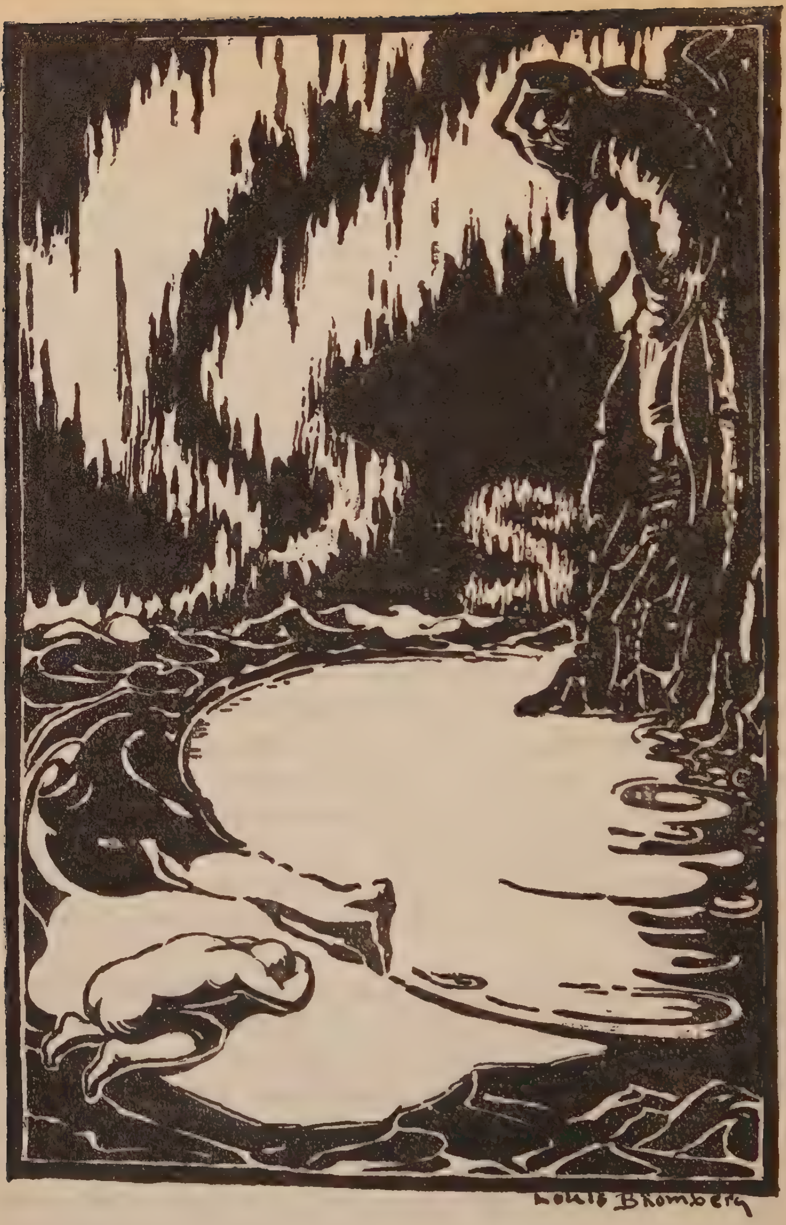
Berlioz (1803–1869) was a distinguished French member of the romantic school, whose work is admired as a splendid exemplification of a lower flight of music than that of the great masters. Gounod achieved wide popularity for his studious productions, such as the *Faust* and the *Romeo e Julietto*. In Italy, Rossini, with his *Barbiere di Seviglia* and *William Tell,* caught the popular ear at once; as did Bellini (1802–1835) with his *Somnambula;* Mascagni, author of the lovely *Cavaliera Rusticana;* Leoncavallo with *Pagliacci;* and especially Verdi and Puccini. The former of these is ranked by Italians as the equal of Wagner. His *Aida, Rigoletto, La Traviata,* and *Il Trovatore,* for their tuneful beauty, hold wide popularity today, and exceed the popular esteem for his heavier and later *Otello* and *Falstaff*. Puccini is among the more recent composers, with his *Manon Lescaut, La Boheme, Tosca,* and *Madame Butterfly,* high favorites on the operatic stage today. Donizetti is remembered for his elaborately affected *Lucia di Lammermoor;* and Ponchielli, for *La Gioconda.*

In Germany, Humperdinck's *Hänsel und Gretel* is noteworthy in recent music, with a charming light touch throughout. In France, Camille Saint-Saens, especially in *Samson et Dalila;* Debussy, essentially a modernist, as in his *L'Aprés-midi d'un Faun;* Cesare Franck, Ravel, and eccentric genius Eric Sati, are memorable. Russian music is starred with such names as Moussorgsky, Sergei Vassilievitch Rachmaninoff, Nicholas Andreyevitch Rimsky-Korsakov, with his exquisite *Scheherezade,* and especially Peter Iljitch Tschaikowsky, whose compositions in every form of music are appealing revelations of the sorrow-bowed Russian soul. The extreme modernists, Stravinsky and Scriabine, combine sensationalism with real musical beauty. Dvorak, a Bohemian, embodied certain American Negro themes in his balanced *New World Symphony*. Among memorable operas are *Carmen,* by Bizet; *Contes d'Hoffman,* by Jacques Offenbach; and Flotow's *Martha.* The depths of Scandinavian somberness and love of the grotesque appear in Edvard Grieg, especially in his *Peer Gynt Suites.*

The folksongs of Russia are ample in extent, and deeply moving. English, Irish, Welsh, and Scotch folksongs are hardly inferior in number or beauty. England has produced few musicians of note. That master of light opera, Sir Arthur Sullivan, is typically English in his lack of depth, and his ever amusing uses of melody and harmony. S. Coleridge-Taylor, an English composer with Negro blood, is one of the few outstanding figures in English music.

America has lagged almost as woefully, although for popular and somewhat sentimental pieces Reginald De Koven, Victor Herbert, and Ethelbert Nevin are widely known. Recently Horatio Parker, Macdowell, Deems Taylor, and that entrepreneur of jazz themes, George Gershwin, have stood foremost. The work of Gershwin especially is rooted in the exquisite Negro spirituals and secular folk songs, the first of these groups comprising a body of religious folk music unmatched in the world for haunting loveliness. Such songs as *Done Foun' My Lost Sheep, Steal Away, Follow Me,* and others already mentioned, and the secular *Water Boy,* are unrivalled for sheer beauty. The marching songs, *Go Down Moses* and *Ride on, King Jesus,* are superb; while, for religion embroidered with flashes of broad humor, *Every Time I Feel the Spirit, Who'll Be a Witness,* and a score more, are unsurpassed.

Among outstanding interpreters of song, Christine Nillson, Adelina Patti, Jenny Lind, Nellie Melba, Lilian Nordica, Ernestine Schumann-Heink, Lilli Lehman, Luisa Tetrazini, Amelita Galli-Curci, Marie Michailowa, and the inimitable Jeritza, among women; and the brothers, Jean and Édouard de Reszké, P. H. Plançon, Enrico Caruso, Feodor Chaliapin, Emilo de Gorgorza, as well as Scotti and Martinelli, stand preeminent. Kreisler, Heifetz, and Elman as violinists; Pablo Casals on the 'cello; de Pachmann, Levitzky, Paderewski, Rachmaninoff, and Elly Ney, as pianists, are highly distinguished; while the orchestra conductors Leopold Stokowski, Willem Mengelberg, Arturo Toscanini, and Adolf Herz for Wagnerian music, are world famous.


Louis Bromberg

No beast bows down to sky or crag,
Yet man, limp as a drenched rag,
Prostrates himself to crag and sky,
And lifts his longings heaven-high.

BOOK V

THE OUTLINE OF RELIGION

I. THE OLDEST GODS

THE ORIGIN OF RELIGION

Why is a forked wand of hazel or sassafras still believed by many to have the power of locating water or treasure underground? Why did the ancient gods of India have half a dozen hands each and three or more heads; while the Greek gods were merely magnified men? How is the fertility of the olive groves assured in many districts of Asia? What is the evidence for the belief that Jesus was born on the 25th of December? These and countless other questions about man's beliefs can only be answered by a study of comparative religions.

We can indicate here the answers to the above problems briefly. By the medieval "doctrine of signatures," God gave every object, on which he placed the signature of another, the powers of that other object. Thus the forked lightning was supposed to have power to split rocks, and reveal springs or hidden treasure; and every jagged object in nature, like the leaves of the hazel and sassafras trees, were supposed to possess this same power. The word *sassafras,* like the name of the herb *saxifrage,* comes from two Greek words meaning rock-breaker.

Where Nature is terrible and menacing, as in India, Mexico, Peru, and elsewhere, the gods, representing in part forces of nature, were made terrible: and extra hands and heads added to their power of evoking terror. Greece, with a more temperate climate, permitted gods more like men: although two-headed Janus the Roman god, hundred-handed Briaereus, fire-breathing Typhon, the one-eyed Cyclops, and dreadful Chimaeras, Hydras, Harpies, and Gorgons, in Greek religion, shared in small the power of the major Indian gods in evoking terror.

The fertility of the olive groves in many parts of Asia is secured by man's teaching nature how to reproduce. Instead of general sexual orgies used for this purpose, the priests go out into the groves and wed the trees as a man weds a woman.

The birthday of Jesus, in early Christianity, was originally placed upon another date. The popularity of the worship of the mystery religion of Mithra caused early Christians to alter their celebration of the birthday of their god to December 25th, the date originally celebrated by Mithra worshippers. By now, this fact is buried deep in early church history.

There have been many definitions of religion. The most accepted one is the minimum definition arrived at by Tylor, in which he reduced the matter to its simplest elements, defining religion as the belief in spiritual beings. Heaven, hell, personal immortality, the need for prayer, religious ceremonials, are merely elements added to the basic one. The scientific definition would be: Religion is that branch of sociology which deals with the group relations of men and real or imaginary spiritual beings.

The lowest savage races that have been discovered have no religion: just as the highest animals outside of man have no religion, as far as we have evidence. At an early stage a belief in spiritual beings arises spontaneously and naturally, as the study of primitive psychology shows. The savage began to believe that he possessed a spiritual double, different from his physical body. He found much evidence for this belief, furnished especially by:

1. Reflections seen in a pool.
2. Shadows caused by sun or moon, and echoes.
3. Dreams, trances, and epileptic seizures, after which the savage insisted to his incredulous tribesmen that he had wandered and done various deeds.
4. The phenomena of death, in which something has gone, although the body remains.

Modern religious authorities say that, while these physical manifestations (except death) may be explained scientifically, they permitted primitive man to grasp intuitively at the truth of the existence of a soul. Scientists claim that all of these, including death, are simple facts, explicable by science, and common to the animals as to man.

The objective evidence of the reality of spiritual beings came to primitive man in many ways. Things moved, as he moved: the branch and the tree shook in the wind, the sun and moon moved from behind clouds and across the heavens, the stream's water moved. When man moved, he was, he knew, a personality *willing* the movement; therefore, he reasoned, all these, branch, tree, sun, moon, water, must be personalities willing the movement; and hence must be spiritual beings, or gods. Modern religious authorities say that, while these physical manifestations may be explained scientifically, they again allow man to seize intuitively upon the truth that gods exist.

Even before men evolved a priestly class, primitive man believed that he could control the actions of these gods by certain magic rituals. Thus making a loud noise would drive away devils; as, later, the sign of the cross was believed to be efficacious in driving away devils. This stage of religious development was *fetichism,* the belief in the magic power of objects, actions, and words. This was followed by nature-worship, or *totemism,* in which natural objects like trees, stones, lakes, and animals, were worshipped. The priestly class came in, and the stage of *shamanism* was reached. The tribesmen were taught that only the priest, or *shaman,* could reach the faraway gods. *Idolatry* came next, with great anthropomorphic gods, or gods modelled upon men, worshipped as parts of nature. *Theism* followed—the stage in which the gods were regarded as the creators of the natural universe. This last stage, joined with morality, is the present stage of religious development, in all of its intricacy.

Modern civilized man is so close to the savage, that all these stages of the development of religion persist even in advanced cultures, in unexpected and hidden ways. The most cultured Roman Catholic performs fetichism when he or she repeats the rosary. Totemism is evidenced in the worship of the relics of saints, or ascribing efficacy to their touch. Shamanism appears, when a priest is paid to say masses to save a soul from purgatory, and also in the episcopal succession, or the touch of every bishop and priest by some bishop who has received his religious power relayed from hand to hand, tracing back to St. Peter. Idolatry is seen when genuflections are made before statues of gods, god-mothers, or saints. Each religion has some form of these stages in the evolution of religion.

The priest or shaman, who went into strange trances in which he communed with the deity, was probably originally an epileptic; many founders of religions have been epileptics. Modern religious authorities say that this strange physical state made such men and women unusually sensitive to religious truth and revelation. The power of the priests grew naturally. There were always rival groups of these. One set would pray for rain, another set against it: depending on the natural phenomena that followed, one priest or set of priests would be exiled or killed, and the other glorified. Early man had no other test of a religion than whether its prayers and prophecies came true.

The fetich or worshipped object, like the sacred meteorite, the black stone Kaaba at Mecca, used at first as a scarecrow to frighten away evil spirits, became altered in popular meaning to an object that would attract good spirits: all religion has progressed from fearing gods of hate and terror, in the direction of adoring gods of love and benevolence. In order to attract the good spirits, and hold them captive, the fetich was smeared with oil or blood, which men liked, and hence believed that the good spirits would like: "and the odor of the sacrifice was sweet in the nostrils of Yahweh," to use the Old Testament phrasing. From this came the custom of slaughtering animals and men before the idol, to please the good spirit; and sacrifice had come in. At first, it may have been partly a sacrifice of a person symbolizing the tribe, to secure the evil spirits' sparing of the rest; by a sort of barter with the god, in which he accepted one in return for ceasing to plague the many. The offering of oil or blood was made to the god with ceremonial speeches and songs; thus prayer and ritual worship came in. Even the worst gods were called from the first by flattering names: thus the Greeks called the dreadful Furies the *Eumenides*, or well-wishers, to wheedle favors out of them; thus medieval Christians called the devil *the old boy,* or *the old gentleman,* to keep in his favor. A shelter was at length built to protect the idol from the elements; so the first church was built.

Many things were evil fortune, or *taboo;* they were supposed to be able to strike with pestilence, or with immediate death. The ark of the covenant, in the Old Testament, had the power of killing those who touch it without reverence. Certain animals, the name of the god, corpses, working on a holy day, and a thousand lesser things, became taboo: the Old Testament has God taboo the wearing of garments made of two kinds of cloth, or the sowing of a field with two kinds of seed. Taboo customs play havoc, at times, with philology; thus certain Polynesian tribes taboo, on the death of anyone, every syllable in his name, no matter in what word it appears; and the whole vocabulary alters at each death, and in a score of years may be unrecognizable. It was the spirit of taboo that made it sacrilege to pronounce the name of the chief Hebrew deity, Yahweh. This taboo assumed the form that knowing the name of man, thing, or god, gave the knower power over it: so, if the enemy could learn Yahweh's name, they could conquer him.

As we have seen, agriculture came when men noticed that, where ground had been broken for a grave, and grains of cereal left there for food for the dead man, the cereal sprouted. The idea growing out of this was that a man had to be killed, to make grain grow and the fields yield. The first fruit of grains, animals, and even men was commanded by Yahweh; although a means was provided for sacrificing symbolically on the birth of a child. Neighbor nations of the Hebrews never grew beyond the stage of the sacrifice of the first-born: which may well have grown in part out of the father's resentment against the baby that took from him certain of his mate's affection, causing the father to announce divine requirement of the killing of the first-born. Then the idea spread to men that the fields brought forth fruit and grain as he himself brought forth children; and man's intense sexual nature soon decided that the gods of nature were bashful or forgetful, and needed men to remind them how the sexual act must be performed. So men and women went out into the fields, and by their actions reminded the god; and sexual license became religious virtue. As we have seen, at times the mating was held directly with tree or field. Later, this was symbolized by union between priests and virgins in the temple.

Initiation of the young into the tribe, at the period of puberty, gave rise to further sexual festivals. These survive in confirmation in the Christian church, and Bar Mitzvah among the Hebrews. The Jewish rite of circumcision, originating as a puberty rite, slowly regressed to a birth rite. Men began to exaggerate the deeds of their ancestors, particularly of the remote ancestor who was believed to be the father of the tribe. "God the father" meant, at first, not god the artisan creator, but god the physical father. In the end the actual or half-mythical ancestor of the tribe was elevated to the tall rank of a tribal hero, or demi-god, or a god himself.

Then men, led by these little gods, went forth to war. When they conquered an enemy (and his gods), they made the survivors accept the worship of their god; made them also their servants or slaves; and often made the conquered gods the attendants of their own god, or lesser deities in his court. Thus great gods, heading great systems of gods, came into being. Constantly wiser men saw that this elaborate system was untrue: constantly wiser men intuited that the origin of men and the universe was not multiple, but single. And so every race has had its religious reformers, who sought to bring the worship back to one god, or beyond this to a recognition that nature needed and had no deity. Yet men remain close to savages; and soon enough they reverted to the popular worship of their hierarchy of gods. The gods were given ultimately such qualities as omniscience, or the power to know everything: it was believed that after death they punished all undetected crimes, and, later, that they also rewarded all virtues. Thus heaven and hell were erected as subjects of man's belief, with personal immortality as a necessary corollary, beginning weakly (as among the ancient Egyptians and Hebrews) and constantly strengthening in the faith of the people.

THE RELIGIONS OF ANTIQUITY: THE CELTS

The primitive Celts, who once overspread Europe, had their strange primitive religion. Their priests, the Druids, with naked bodies painted with blue woad, worshipped their gods, Bridget, Ogmius, Mapomus, Patrick, and others, in rude open stone circles like Stonehenge in England, or in oak groves. Hundreds of victims were killed at their great festivals, in order that the soil might become fertile. On May eve, the feast of Beltane was a sexual orgy in the fields; this popular feast slowly altered its nature into our May Day and Easter. Lugnasad, held on August 1st, and Samhaim, in October, were similar; both persisted as Midsummer's Eve or St. John's Eve, and as Hallowe'en or All Saints Day. Bridget, Patrick, and other conquered Celtic deities were ultimately enrolled in the number of Christian saints.

No stranger chapter in man's religion exists than the transformation of this worship into the pervading witch worship that still is so strong in ignorant minds in both Europe and America. Backward communities still fear shrivelled old women, believed to possess the power of the evil eye, or some other potency granted them by the lord of the witches, the devil: although this deity was once the sky-father, Divanus, from whom Janus and Janicot derive their names, an Aryan deity akin to Dyaus-pitar, Zeus-pater and Jupiter, with a consort Divana, or Diana, who entered under this last name into Greek and Roman worship. The gods of a conquered race frequently depress to the role of devils of the conquerors.

The conquered little Celts themselves, hiding during the day and skulking out at night for food, and forced for life's sake to be bloody and terrible in defense when discovered, gave rise to the widespread European belief in the Little People, the Lower People, the fairies, kobolds, gnomes, goblins, brownies, and other mythical half-gods; and to the witches and wizards who are believed to preside, with the devil, over the revels of these Little People. The strange ceremonial of the witch worshippers, the Black Mass, with a living human altar; their belief in animal familiars and witch-marks and extra teats; their organizations into Covens (from Latin *con-venio,* to come together, from which convention and convent also come) always of thirteen, a leader and twelve followers, similar in number to Jesus and his twelve disciples; their illustrious adherents, like Joan of Arc and her lieutenant Gilles de Rais, field-marshal of France, both executed for witchcraft—all these marked a still living submerged religion, older far than Christianity.

IN BABYLON AND EGYPT

The religion of Babylon, at first, was in the stage which Tylor calls *animism,* where everything in the environment is animated or endowed by savages with life, and at the same time deified, or endowed by them with a spiritual personality. The early Semitic conquerors of Babylon brought their desert animism to the fertile valley, worshipping especially Ishtar (the Self-Waterer), the spirit of the oasis. For all men in the end make of their gods that which they most desire: and, to desert dwellers, the oasis is power, and heaven, and at times life itself. The lover of Ishtar was Tammuz, the spirit of the date-palm; and at certain times the spirits of the sun, the moon, and the wind were also regarded as her husbands.

This was as early as the matriarchate, when primitive women ruled, and fatherhood was unknown: all religions of antiquity have, hovering above their later deities, the shadows of vast earlier goddess-mothers. When the patriarchate came, these original god-mothers were slowly displaced by male gods. Thus the female god Ningirsu (Lady of Girsu) became the male god of the city of Lagash, still retaining the revealing feminine name. The gods multiplied infinitely; one by one the conquering cities elevated their patron deity to be the chief god of the universe.

As long as Babylon led the empire, the chief object of worship was Bel-Marduk, its god, as head of a graded court of lesser divinities. Again and again great trinities of gods ruled: as Shamash, the sun; Sin, the moon (whence Mount Sinai received its name); and Ishtar, the fertile oasis, later transferred to the planet Venus; or the trinity Anu, the sky; Bel, the earth; and Ea, the sea. But Ishtar, mother of the gods, spirit of sex and fertility, never quite lost her hold. When her worship travelled, she became called Ashtoreth in Syria, Astarte in Asia Minor, Aphrodite in Greece, Cybele in Italy, Isis in Egypt and Rome, and stranger names in stranger lands.

In the religious practices, every woman had to submit herself to a stranger, in order to become fertile: this being a symbolic semi-return to the primitive selective promiscuity. The priests, who came to play the part of the stranger, charged highly for performing this duty, and grew enormously wealthy. The Babylonians held that every seventh day was evil; the fourth of these seventh days, called *Shabatum,* was believed to be the worst of all. Evil gods and things alter to good gods and things: the witch-cult Sabat, the Hebrew Sabbath or holy day, the Christian Sabbath or Sunday, came from the Shabatum.

Egypt, with its dreadful floods and dreaded beasts, began with a religion of fear: the sun, the moon, the Nile, the beasts, became gods. When the tribes became settled, their nomad gods became city-dwellers: Amon, the ram, god of Thebes; Ptah, the bull-god, of Memphis; Set, the ass-god, of Ombos; Sekmet the lioness, Anubis the jackal, and Horus the falcon, of several places. The greatest monotheistic or one-god reformer was Ikhnaton, in the 14th century B.C., who suppressed all earlier gods in favor of Aton, the sun-god. With this man's son, Tutenkhaton, the worship of the old gods came back; even the pharaoh's name was changed back to Tutenkhamen, after the god Amon. The many gods persisted: but the faint idea of one god lived on.

Immortality of the individual, and a rigorous judgment day, grew faintly as well; and a great divine drama was built around Osiris, the Nile god, married to Isis, the fertility goddess, and murdered by Set, god of night, darkness, and evil: with a subsequent strange resurrection for Osiris. Thus

Nature's springtime rebirth was lifted into the heavens as a religion.

GREECE, ROME, AND THE MYSTERY RELIGIONS

Among the Greeks, the early Cretan civilization worshipped chiefly a mother-goddess like Ishtar, probably named Ops or Rhea, and later identified as the wife of Chronos or Saturn. The conquering Aryan-speakers who flooded the peninsula brought with them Zeus-pater, the sun-father, and other gods. Ops was made mother of Zeus; other native gods became Hera, his wife; Athena, his daughter; Poseidon, the sea, and Hades or Dis, the underworld, his brothers; and Apollo, a local sun-god, his son. These gods (largely adopted later by the Romans) were in part as follows, both Greek and Latin names being given:

Greek	*Latin*	*God of*
Chronos	Saturn	Dethroned god-father
Ops	Rhea	His wife
Zeus	Jupiter	God-ruler
Hera	Juno	His wife
Poseidon	Neptune	The sea
Hades, Dis	Pluto	Underworld
Hephaestos	Vulcan	Metal-work
Dionysos	Bacchus	Wine
Ares	Mars	War
Phoebus Apollo	Apollo	Sun-god; music
Aphrodite	Venus	Love
Eros	Cupid	Love
Pallas Athena	Minerva	Wisdom
Hermes	Mercury	Athletics, thieving, commerce
Demeter	Ceres	Fertility
Artemis	Diana	The moon; the chase.

Greece had almost grown above the fear of the gods; deities were regarded as mere supermen, loving, hating, fighting, and playing, as men did. The wiser Greeks graduated into philosophy; the ignorant masses slumped back into eccentric savior-worships, in the various mystery cults. The more sober early Eleusinian mysteries were replaced by the worship of the resurrected savior Orpheus, worshipped in the Orphic mysteries from Thrace. Other popular mystery cults were the service of the Egyptian savior Osiris, the Phrygian savior Attis, the Syrian Adonis, as well as such other saviors as Dionysos, Zagreus, Zabazius, Mithra from Persia, and, later, Jesus.

When Greek culture reached Rome, it found a race which had created many gods, with a large ancestor-worship present. Each man had a Genius, a spirit of virility; each woman, a Juno, or spirit of conception. Each threshhold had its two-faced Janus (from the Sanskrit Divanus, the sky-god, who became the chief Celtic god, in the earlier and later forms of the witch-cult); each hearth had its Vesta. The consort of Divanus, Divana, later became known as the Roman Diana. The tribal religion centered around Mars, god of war, and Jupiter, a sun-god, akin to the Sanskrit Dyaus-piter and the Greek Zeus-pater, both sky-gods.

Great festivals, the Lupercalia in March, and the Saturnalia on December 25th, with wild dancing, gift-giving, and lighting many candles, were widely celebrated; certain elements of our Christmas come from the latter of these. The neighboring Etruscans had contributed Minerva, Diana, and other gods. Roman religion became more and more ecclesiasticized or churchified, as Greek worship had never been. This formal faith, with its frigid observances, sank into decay; the people leaned more to the warmer worship of Cybele, a mother-goddess from Asia Minor, which came in as early as 200 B.C. This contained mad bacchantic revels, ending in the emasculation of male worshippers, who "made themselves eunuchs for the kingdom of heaven's sake."

The rite called the Tauroboleum, a baptism in and drinking of bull's blood, survived in Christian baptism and the Christian communion service, which symbolizes a forgotten stage of cannibalism. The worship of the lover of Cybele, the resurrected savior Attis, also became very popular in Rome; as did the worship of similar saviors, Tammuz, Adonis, Dionysos, Osiris, and Orpheus. Augustus tried to divert religion into a worship of the emperors as gods; instead, Rome yielded overwhelmingly to the Persian myth of the savior Mithra, whose miraculous birth was witnessed by a few shepherds coming from afar with gifts; with the struggle, death, and resurrection in heaven of the savior Mithra; and his worship especially on the Sun-day and also December

25th, which was celebrated as his birthday. There was also a symbolic eating of the flesh and blood of the god, which gave immortality to the worshippers; and only the baptized were believed to survive the judgment day.

This came from Persia; and here a great mythical religious teacher named Zoroaster or Zarathustra had lived and taught—one of that brotherhood of man-invented founders of religion which includes many among Moses, Mahavira, Buddha, Lao-Tze, Krishna, and Jesus. Historians still quarrel over whether these men lived or not. To the student of comparative religion, this is not the essential question: for some living man or men combined the elements that made the religions. The Persian worship, attributed to Zarathustra, was a magnificent dualism, or worship of two gods: consisting of a contest between Ahura-Mazda, god of the sun, light, and good, and Ahriman, god of night, darkness, and evil. The old word *deva,* which had meant gods (akin to Greek *theos,* as in *theology,* and Latin *deus,* as in *deity,* both meaning god) was altered by Zarathustra to mean *devils.* There was a heaven, and a hell.

The high religion degenerated speedily. The abstract gods were made persons; the angels increased from the original six to, in the end, ten thousand, opposed by thousands of devils. The degenerate priests, or *Magi,* gave to the world the word *magic.* The older god Mithra, regarded as a son of Ahura-Mazda, survived to lead the invasion of the Mithraic mysteries into Rome. In Persia, this was succeeded by Manicheism, a religion founded in the 3rd century by the Persian prophet Mani, crucified by Magian priests as a heretic. There is still a small living clot of Parsees, who have survived all the shocks of later history; these still await the coming of the promised Persian redeemer.

ADDITIONAL READINGS

PRIMITIVE RELIGION. *The Golden Bough,* by Sir James George Frazer, is an absorbing and accurate comparative study of early religions. The one-volume edition is the handiest. *Myths and Myth-Makers,* by John Fiske, is both readable and informative.

CELTIC AND WITCH WORSHIP. *Witchcraft and the Black Art,* by J. W. Wickwar, and especially *The Witch-Cult in Western Europe,* by Margaret Alice Murray, are highly recommended. The novel *Down There,* by the Frenchman, J. K. Huysmans, is fully informative on the same theme. The last two of these deal exhaustively with the cases of Joan of Arc and Gilles de Rais as witch-worshippers.

GREEK AND ROMAN MYTHOLOGY. *The Age of Fable,* by Thomas Bulfinch, is the most readable brief account of this faith.

II. THE RELIGIONS OF INDIA

LIVING RELIGIONS OF MEN

Thus far, we have dealt with religions long dead, except among that socially insignificant ten per cent of the world's population who are still in the stage of animism, or a worship of movement in nature, which backward men hold establishes personality and divinity in nature; and except for survivals among Parsees and witch-worshippers. All Christians hold that these early religions were based on error; so do all Jews, all Moslems, Buddhists, and Confucianists. Each of these faiths holds further that all other faiths but itself are based on error.

Yet, in order to study fairly these faiths, we must alter our attitude, from that of unbiased critical observation, to that of faith. Even if error is present in any of these religions, it is an error believed in, as a matter of faith, by millions of people. Errors are steps toward the truth. The errors of the Mosaic writer about creation were succeeded by the errors of Copernicus, Galileo, Laplace, and Newton: these errors by—shall we say?—the errors of Einstein. Truth is an ideal never to be realized wholly by man's mind, due to its essential limitations. The best that man can do is to replace obvious errors by errors less obvious; man's broadening generalizations constantly approach that constantly receding phantom, truth. All errors will be wiped out together, when the earth ceases to be habitable, in some astronomical judgment day, of fire or ice, vastly more terrible than any that a religion has dreamed.

From the viewpoint of faith, then, let us look at the living religions. The world is divided religiously into:

Animists	136,325,000	8.3%
Hindus	210,500,000	13.1%
Buddhists	135,000,000	8.2%
Moslems	219,000,000	14.2%
Confucians and Taoists	301,000,000	18.2%

Shintoists	20,500,000	1.2%
Jews	15,500,000	.8%
Greek Catholics	122,000,000	7.5%
Roman Catholics	273,500,000	17.0%
Protestants	171,000,000	10.5%
Unclassified	16,000,000	1.0%
	1,620,325,000	100.0%

Many more than the number listed as "unclassified" above, and included statistically under various religions, are in reality rationalists, infidels, or people living without religion.

INDIA'S FIRST RELIGION: BRAHMANISM

India has given five great religions to the world: Brahmanism, Jainism, Buddhism, Hinduism, and Sikhism. The white Aryan-speaking races which entered the black-peopled India, long before history began, were wandering shepherds, worshipping many gods, including the "three and thirty;" these were all worshipped with beer scattered over beds of straw. Most powerful of these gods was Indra, the boastful, gluttonous, drunken brawler, who controlled the fierce wind and rain. There were also Dyaus-Pitar, the sky-god, later the sun; Agni, god of fire; Mithra, a sun-god, remote ancestor of the Persian god; and many more. Each family was the center of worship at first; then a vast churchification of the religion took place. The Vedic literature, already described, originating at least as early as 2000 B.C., was written at the time of the coming of this religion to India.

Ages passed, and the conquerors became a series of rigid castes superimposed upon the black conquered of India. The priests, or brahmins, remained at the top of this monstrous social system. In their hands, since religion was in the stage of shamanism, was reposed all power of appeasing the anger of the gods. The Brahmanas, or priestly literature, fell into disbelief; the Upanishads, or Seances, appearing about 700 B.C., threw the old system overboard, in favor of a worship of Brahma, the Self of the universe, with all phenomena of life and nature mere manifestations of Brahma. Death meant mere absorption into Brahma; personal immortality gave way to a return into the universe. Man's duty was to live the life of an ascetic, and be gradually wasted into Brahma. Appetite must be killed, desire strangled, inertia the aim of man. India . . . land of inertia . . . its hot discomforts salved only by living void of motion and desire. . . .

JAINISM AND BUDDHISM

Then came the heresies. In the 6th century B.C. two great sects arose: the lesser of these was Jainism. Its founder was the mythical prince Mahavira, a rioter until thirty, and an ascetic afterwards. Over-saturation in anything breeds its opposite. After twelve years of seeking, Mahavira reached Nirvana, or peace. He disbelieved in the gods, and mocked at prayer. His highest commandment was "Thou shalt not kill"—which his followers carried into effect by refusing to kill India's prolific vermin, and by even failing to remove the living dust from their houses, clothes, and bodies. Only one form of killing was permitted: suicide.

After Mahavira, the Jina or Conqueror, died, he was at once made a god. Twenty-four additional Jinas were invented; female divinities were added, until the pantheon or hall of the gods was thronged with the very spirits Mahavira had disbelieved in. The Jina had revolted against the caste system; when he died, it came in again, not only to divide the people, but even to divide into castes the resurrected gods.

In the same century in which, according to legend, Mahavira was born, Gautama Buddha, founder of a far more potent religion, is said to have been born. Rioter until thirty, he too turned ascetic. After long years of futile striving to find peace, in which he tasted of all the denying faiths of the land, suddenly the ecstasy of salvation flooded him. Faith had come: and he returned to man, to preach one doctrine—the folly of excess. He had been saturated both with riotous pleasure and with asceticism: he fled from both back to a sober denial of all desire, or a sane striving against it. His Four Truths were:

1. Birth and death bring grief, and life is vain.
2. The vanity of life is caused by indulgence in desire.

3. Its only cure is the ending of all desire.
4. Not asceticism, but sane and intelligent decency, is the way to end desire.

His "Middle Path" of right living was the "Eightfold Noble Path" of "Right Belief, Right Resolve, Right Speech, Right Action, Right Livelihood, Right Effort, Right Thought, and Right Meditation." Not physical torment, but mental discipline, led to Nirvana, or everlasting passionless peace.

This religion left no room for gods, for priests, or for prayers. It routed caste. It glorified social ethics, and a sane decent living: even if its aim was to root out desire, the goad of life and progress. Early Indian religions had believed in the transmigration of the soul, into other bodies, even those of ainmals; Buddha saw the soul as merely the fruit of desires and thoughts; and, when these ended at death, the soul ended too. Only deeds, or Karma, counted; not faith, but good works, as the early Hebrew Christians, James and the rest, held, opposed to the teachings of Paul.

Siddarta Gautama, the Buddha, died; within three centuries, he too was worshipped as a god, with his squat-bellied idols in every temple. Instead of a religion of social morality, the conquering Buddhism which overflowed the East was a religion of ritual. The further it spread, the more it altered. In Thibet it has a pope, the Dalai Lama, and a vast hierarchy of priests, with prayer-wheels covering the land. In India, the religion largely died; in its altering form, it reached as far as Japan.

INDIAN RELIGIONS TODAY

India itself ultimately took rather to a resurrection of Brahmanism, called Hinduism, than to the two great heresies. This is less a religion than a religious social system. More vital to it than its theologies is its caste system. There are at least 57 sects in the religion, each with its own gods and rituals. The whole is vaguely united by a worship of the Hindu trinity of Brahma, Vishnu, and Shiva: but this is a slight tie. Brahma, the creator, never became more than an unloved abstraction. Vishnu, the preserver, is powerful, due to his habit of incarnating himself in human bodies—"avatars," as the reincarnations are called. The great Hindu epics, the Mahabharata and the Ramayana, enshrining him, are the final and most popular poems in all Hindu sacred literature. The first tells the avatar of Vishnu in the mythical hero Krishna; it contains the Bhagavad-Gita, or Song of the Adorable. The second poem tells of Vishnu's avatar in Rama; there are countless more incarnations in military chieftains, village milk-men, and even in elephants and tigers. The religion is amazingly divided today by a dispute as to whether man is saved by Vishnu as a new-born kitten or a new-born monkey: the mother doing all the saving of the kitten, and the young monkey aiding itself with the clinging strength of its own feeble paws. Man as a new-born kitten or a new-born monkey: strange concept to Occidental minds, which begin to see man as the shaping creator of his own upward climbing.

The third of the trinity is Shiva, the destroyer—a wild sullen deity, bearing a trident and a rosary, from which the Catholics received their rosary, by way of the Moslems. Shiva receives the most worship: man still worships god as a fear-demon: "The fear of the Lord is the beginning of all wisdom. . . . Fear God, and keep his commandments." A god passionate, violent, licentious, the masses of India adore him, as the avatar of their own desires. They worship as sincerely his sluttish wife, Parvata the terrible. The Thugs, a band of murderers, and ravishers, slew and raped in her name; the Tantrists, a sect of sexual perverts, still indulge in wild sex orgies in her foul honor. Passion, these hold, is a poison; the only cure for poison is more poison. Only indulgence in man's five vices—wine, meat, fish, mystical gestures with the fingers, and sexual looseness—can purify the soul. Some scholars assert that sex is at the root of all religion: there is evidence for the viewpoint, and the masses of India stop with this. The higher thinkers have refined Hinduism almost beyond Occidental comprehension; and meanwhile the masses wallow, under the terrible leer of Shiva, the avid lust of Parvata.

Out of this higher Hinduism has come the recent recrudescence of New Thought, Theosophy, Leagues for the Contemplation of the Oversoul, and all the manifestations of the philosophers belonging to the school called *Yoga,* a word akin to the Latin *jugum* and the English *yoke,* and meaning union with Brahma, the universal Oversoul. The yogi trance carries the worshipper into a hysterical union with the Oversoul, to be ended by a dreadful return to earth again. The man who has once experienced this is henceforth a yogi, above human vices and virtues. Most impressive of all these religions is Bahaism, an ambitious attempt to furnish a composite synthetic religion for all the world, to embrace all other beliefs. To achieve this, the religion had to omit all elements which might offend any other faith: which leaves the residuum as vague as a fog. This is slowly making its way today throughout the world. If religion is necessary, if religious belief is needed to supplement science today, this may conquer the world in the end.

ADDITIONAL READINGS

The Hindu religious poems, the *Vedas,* the *Brahmanas,* the *Mahabharata* and *Ramayana,* are all available in cheap prose translations.

III. The Religions of China

CONFUCIANISM AND THE REACTIONARY TENDENCY

The early religion of China is shrouded in the mists of prehistory; it seems to have been a worship of a Ruler of Heaven, accompanied by a worship of many spirits on earth. Ancestor worship undoubtedly played a large part. The stage was animism, a belief in spirits inhabiting all nature, animate and inanimate; coupled with reverence for one's forefathers. The Ruler of Heaven was the personal ancestor of the emperor; so was the great Spirit of the Earth. No man but the emperor could sacrifice to these. The emperor also worshipped the spirits of soil and crops and river; and, if these refused to function satisfactorily, he deposed them, as effectively as King Cnut set his heel upon the prostrate oncoming tide, and ordered it to withdraw.

This was the state religion; the other Chinamen merely worshipped each his own ancestors. When a great man died, clothes and food were put into his grave; retainers and relatives were usually slaughtered, to accompany the great man on his further pilgrimage. China, to stop the waste, invented the "make-see" system, by which clothes of paper, and wooden dolls to represent the relatives and slaves, were substituted. Primitive man found it easy to trick his gods.

The Chinese found it especially easy to do this, because, due to an early spirit of scepticism or doubt, they refused to speculate as to what happened to the soul after death. It went somewhere: but who knew, or cared, where? The ghosts of the dead must receive sacrifices; so these sacrifices were made to living impersonations of the dead, who sat still during the ceremony, and then aided in eating the sacrificial food. Later, tablets of stone replaced the human impersonators, alike in the temples of the emperors and the huts of the peasants.

These sacrifices to the dead were really elaborately ritualized family feasts, containing songs and dances continued until the prayer officer declared that the ghosts were satisfied. A blessing of the family, a tremendous noise of musical instruments, and the ghosts would politely withdraw, to let the family clean up after the feast. Somewhat as in the early Greece, the spirit of fear was almost non-existent. This lack of fear of the gods may have caused China to take the lead in early civilizations. The worship of ancestors, and of old ways of doing things, soon ended the tentative steps toward civilization; and China entered upon its long centuries of national slumber.

Confucius was not the founder of Chinese religion, or even its reformer. He was rather its preserver. Twenty-five hundred years ago, when the faith was about to decay, he took hold of it, and revived it so thoroughly that it has continued until today. He said of himself that he was "not a maker, but a transmitter, believing in and loving the ancients." Jesus of Nazareth said, "Think not that I am come to destroy the law and the prophets; I am come; not to destroy, but to preserve;" and then he proceeded to erect his altered and softened religion in place of the law and the prophets. But Confucius altered nothing.

His Chinese name was Kung-fu-tze; he lived in that amazing 6th century B.C., which also produced, according to the legends, Mahavira and Buddha in India, Zoroaster in Persia, and Jeremiah, Ezekiel, and the second Isaiah in Israel. We know little of his early life; at twenty-two he was said to have become already a teacher. He spent his time collecting and editing the old sacred writings; until, at fifty, he was called into practical affairs, by being appointed chief magistrate of Chung-tu. Tradition says that within a year he had rid the city of all crime: subjecting all life to an elaborate etiquette, regulating the food for each class of the people, directing every detail of the lives of the living, and the entombment of the dead.

For this success, Confucius was elevated higher and higher, until he became Minister of Justice of the entire province. Again he straight-jacketed the people with such elaborate rules and regulations, that all crime disappeared. The duke grew jealous, and Confucius left the province, to offer himself to ruler after ruler, unavailingly: somewhat as Columbus wandered from court to court of Europe, seeking a royal patron for his voyage beyond the edge of the known world. For thirteen year Confucius wandered in vain; and in despair, at last, he died.

The yoke Confucius laid on his people is still heavy upon their necks. The books collected by him and his disciples, the five *king* and the four *shu*, still regulate the minute details of Chinese life. This was true, in spite of the fact that Confucius was in no true sense a religious man. He knew little about the gods, and cared less. "So long as you are not able to serve men, how can you serve the spirits?" he asked. "So long as you do not know life, how can you know death?" he persisted. Wisdom consisted in serving other men, and in respecting the spirits, without making any fuss over them. He knew that what a superior man sought was to be found only within himself: "The kingdom of heaven is within you;" "Know thyself." He too held that deeds were the vital thing—not belief, nor a ritual of magic-working performances. He went so far as to say that the stars in their courses were held there by the moral deeds of men: there have been showers of shooting stars ever since, and their number is not diminishing. Confucius was a shaman or priest who relied on moral laws, rather than on magic formulae.

The great philosophers, in Greece and elsewhere, differed from the Chinese preserver in that every one of them sought to discover new truths, to lead man's intellect along new paths. Not so Kung-fu-tze: to him the good was the old, the tried, the safe. He doubted the old gods, but did not doubt the ceremonials paid to them. Propriety, regularity, careful following of the 300 points of ceremony and the 3,000 points of behavior—these were morality, the ultimate object of life. Whatever came from the fathers must be the final goal of the sons. Respect for the dead hand and the dead mind of one's ancestors was the highest virtue. Demanding that virtue of all men, Confucius died.

At his death, he began to grow, like a corpse bloated by the organisms of decay. His disciples wrote down his words in huge Analects; a century later, his great disciple Mencius spread his doctrines widely: Confucius was exalted, until at last he became a god, by tardy steps. In the year 1 A.D. he was canonized, or made a saint or minor deity, as "Duke Ni, the All-Complete and All-Illustrious." By 57 A.D., all the colleges had to sacrifice to him. In 89 A.D., he was imperially named an Earl; in 267, elaborate animal sacrifices were decreed to him four times a year. In 492 he was named "The Venerable Ni, the Accomplished Sage." In 555, separate temples for his worship were ordered in every prefecture in China; in 740 his image was placed among the ancient kings of China. In 1068 he was named an Emperor. In 1907 he was lifted to the full grade of worship, ranked with the gods of heaven and earth. . . . The simple teacher and repeater of the wisdom of the past, growing, like a corpse bloated by the organisms of decay. . . .

On earth, he had for years no home; he now has 1,500 temples. On earth, for years he starved; he now has over 62,000 animals slaughtered yearly to do reverence to his thin ghost. On earth, he saw no use for prayer; millions of prayers lift to him daily. On earth, he saw no use for gods: he has bloated into a god. The son of man has not where to lay his head. . . . Then, like a corpse. . . .

TAOISM AND CHINA TODAY

The practical Confucius is not the only Chinese man-god; the mystical Lao-Tze has risen as high. We have no story of his life, even a legendary one; instead, we have merely 248 Chinese words, written down five centuries after the date assigned for his death. Lao-Tze, "The Old Scholar," or "The Old Boy," is supposed to have been born in 604 B.C., and to have been librarian of the province of Chou. There is a legend that Confucius vainly sought wisdom from him; and left, calling the librarian an inexplicable and terrible old dragon. Unlike Confucius, Lao-Tze had a mind tremendously inquisitive, speculative, and adventurous. His question was, *Why? Why?* Science today has altered this to *How?;* but the spirit is the same.

There is a story that Lao-Tze, fleeing from anarchy in Chou late in life, was halted by the obscure captain of a garrison, and ordered to write down his philosophy of life, before disappearing in a self-imposed exile. Whereupon, says the story, Lao-Tze wrote out the *Tao-Teh-king,* the bible of the Taoist religion. Barely 5,000 words in length, it seems clear to scholars that this is not the work of the old librarian; but some of the sayings may have been his preserved in man's memory. The first half of the book, the *Tao,* tells the why of the universe; the second part, the *Teh,* seeks to tell the how of life. Tao is the fundamental reality of the universe. Lao-Tze described it:

> There is a Something undifferentiated and yet perfect, which existed before heaven and earth ever came into being. I do not know its name, and if I must name it, I can only name it Tao.

The essence of the activity of the Tao is that it does everything, without giving a sign of its activity. Its very passivity sets the standard for man's life. Energetic efforts at reform are wrong, judged by the serene Tao. There are but "Three Jewels" of man's character, and the greatest of these is *wu wei*, inactivity. There is but one virtue for man, and that is to imitate the poise and inactivity of the Tao. The true disciple is forever silent, even about Tao. He scorns all learning, and mocks at a hunger for learning: so the old librarian wrote, out of his over-saturation with erudition.

Even to defend one's self from injury, Lao-Tze taught, is needless activity: Jesus, with his "Turn the other cheek," counselled more activity than the Chinese thinker. Confucius taught somewhat as Moses's "An eye for an eye, and a tooth for a tooth;" he taught that good should be repaid with good, and evil with evil. Not so Lao-Tze: he said,

> To those who are good I am good, and to those that are not good I am also good; thus all grow to be good. To those that are sincere I am sincere; and to those that are not sincere I am also sincere; thus all grow to be sincere.

He saw weakness as the height of strength; water, softest and weakest of earthly things, could defeat the strongest things. And water, Freud demonstrated, stood for the mother, the original ancestor; all life originated in water.

Next to inactivity, Lao-Tze ranked humility, as the second jewel: "The meek shall inherit the earth." No one can take from you, unless you take from yourself, he taught; wisdom consists in satisfaction with what you have; ambition is the greatest guilt; dissatisfaction, the worst calamity. The third of the jewels is frugality. Weakness, he held, breeds strength; humility breeds prominence—"The first shall be last, and the last first;" and frugality breeds liberality. As the Chinese thinker expressed it,

> The wise man does not accumulate. The more he expends for others, the more he possesses of his own; the more he gives to others, the more he has for himself.

"Cast your bread upon the waters, and it shall return to you a hundredfold." So taught Lao-Tze. As to religion, in the narrower sense, he was silent. He did not believe in the gods, and opposed all forms of worship. Sacrifice and prayer he held to be vain and impertinent, for they sought to torture nature into harmony with man; whereas, man's duty was to sink passively into a harmony with nature. The supreme god, Shang-ti, is named only once in the *Tao-Teh-king;* and then he is said to be inferior to the universal Tao.

Tradition says that, after he had ended his writing, Lao-Tze wandered off into the world beyond, and was never seen by man again. Common men, hearing rumors of the great book and its disciples, thought that these must be magicians; and soon enough the men became just that, treating the thoughtful sayings as magic formulae. Emperors spent vast sums endowing researches of professors of Taoism, to enable them to discover hidden meanings in the plain statements. A 3rd century A.D. emperor sent out two huge expeditions, to discover magic islands believed to hold the elixir of life, which would make all men immortal, and also to find the philosopher's stone, which would turn all metals into gold. Thus China antedated Europe by almost a thousand years in these odd quests; not knowing that at their finger's-ends they owned both, in the scientific hypothesis of the indestructibility of matter-energy, and of the natural original unity and tardy self-transmutation of the chemical elements.

A religion of Taoism arose; the Taoist hermits organized themselves into religious orders, in whose vast temples the priests, or *Wu,* sacrificed to idols. A high mountain peak in Kiang-si holds the Taoist pope, calling himself T'ien-shi, the Heaven Master. Thus noble thoughts and ideals regress and decay, in lesser minds. In 156 B.C. the old librarian was made a god; for 2,100 years now he has been worshipped as a deity in China.

As Buckle pointed out, man's mental attitude which permits progress is scepticism, or doubt; not faith in the correctness of ancestral teachings. Man's duty is not to sink back into a passive identification with the universe, as India and China held and hold; but to tame his environment, and set it to do his bidding. So, at least, the Western world holds. Between this view, and the passive Eastern opinion, may lie the golden mean.

China today is Confucianist, Taoist, and also Buddhist. In the 2nd century A.D., Buddhism entered China. It offered a personal god, an idolized Buddha whose calm face and round-bellied body might be seen, kissed, and kow-towed to in every temple. Moreover, it told much of life after death, on which Confucianism was silent. Buddhism had its Californian heaven and its Sahara hell, and made prayer for the dead an imperative necessity. Most of all, it was a religion of salvation; belief in Buddha would make life's murk as bright as day. By the 5th century, official persecutions of the Buddhists raged with great severity; these broke out again in the 9th century, with a ruinous razing of the 40,000 Buddhist temples, monasteries, and pagodas. Buddhism has never fully recovered from this blow; but it is still strong in the land.

JAPANESE RELIGION: SHINTO

The primitive religion of Japan received the name Shinto about the 6th century, when Buddhism entered from China.

In the 9th century the two religions were amalgamated into the Ryobu-Shinto, the dual Shinto. In this blended religion the Shinto gods were regarded as avatars of Buddhist divinities; and Shintoism was absorbed, although it never became obliterated. Its beliefs, shrines, festivals, and some of its rites survived the union with the Indian faith.

According to its scripture, the *Kojiki,* the gods created the earth, and peopled it with their own offspring. The actual creation was done by the male god Izanagi and the female deity Izanami. From the right eye of Izanagi was born Amaterasu, the sun goddess; from his left eye, the moon god; from his nose, a sort of Shinto devil. The grandson of the sun goddess was the first sovereign of Japan; in unbroken succession his descendants have ruled the land ever since, the 124th of these being on the throne in 1927. The shrine of Amaterasu at Ise is the chief religious spot in the islands.

The worship consists in offerings, and in the recital of rituals, the *norito,* 27 of which were reduced to writing in *Engishiki.* These liturgies are designed to dedicate shrines, to propitiate evil, to ask for blessing on the harvest, for purification, for obtaining household security, and for asking protection during a journey, and the like. The worship is a mixture of ancestor worship and nature worship, without an explicit code of morals. Men are regarded as virtuous by nature; man's conscience is held to be his best guide. Life beyond the grave exists, but there is no belief that it is either pleasant or painful. The shrines are built of white wood, without decoration of any kind, and fashioned as were the original huts of the first Japanese settlers—a strange proof of the stagnation of religious development. There are no graven images; instead, there is an emblem of the god, a sword, a mirror, or the so-called jewel. This emblem, never exposed to public view, is supposed to have been handed by the sun-goddess to her grandson, the first ruler of Japan. In the 17th and 19th centuries strong revivals of ancient Shinto shook the whole race; although today Buddhism is slowly gaining in strength.

IV. The Religion of the Jews

ORIGIN OF YAHWEH WORSHIP

More than half of the world's people today profess a religion stemming out of Judaism, the religion of which Moses was the legendary founder; of these, only 1/58th still believe in Judaism. Orthodox believers in this religion, basing their belief on the Old Testament, hold that Moses wrote down the first five books of the Bible; that God created the universe in six days, and rested on the seventh; that he inspired all of the Old Testament; that the Jewish race, promised by God to Abraham, were God's chosen people; and that some Messiah will ultimately be born of them, an "anointed one" who must be "the light unto the gentiles, that the Lord's salvation may be unto the end of the earth." This is the broadest view; the more common conception is that the Messiah will come to lift only the Jews.

Like the early Babylonian conquerors, and the Phoenicians, the Hebrews were Semites, originally cradled in the barren wilderness called the Arabian desert. Their religion then was a primitive animism. The one escape from the rigor of their desert existence was by migration to the fertile crescent that girdled the northwest end of the desert, stretching from Nile mouth to the twin rivers in Mesopotamia. The Hebrews tried the eastern end first; Abraham, according to the Old Testament, came from Ur of the Chaldees, or from Chaldea. Their neighboring Semite relatives had conquered Babylon, Phoenicia, and Syria, as the Arameans; the Hebrews themselves tried Chaldea, Haran, Canaan, and finally Egypt. In each case they were thrown back by the natives; but some managed to maintain a foothold in Canaan; and the few who reached Egypt and multiplied there, during the reign of their relatives the Hyksos or Shepherd Kings, escaped from ultimate enslavement in a tribal trek led by the semi-mythical Moses.

Yahweh (or, according to Fagnani, Yaho), ordinarily mistranslated by Christian authorities as Jehovah, is constantly referred to as the "god of the covenant;" in this, he differed from other primitive gods. This covenant was not the covenant supposed to have been made with Abraham; but the significant covenant described as being made by Moses in the shadow of Mount Sinai, at the foot of the Arabian peninsula. The story tells that Moses, a Hebrew exile from the Hebrew slavery in Egypt, fled to Sinai, where the Midianite tribe of Kenites lived; married a Kenite woman; and adopted, instead of the *elohim,* or the gentler gods of the plains of the Hebrews, the Kenite mountain deity, Yahweh.

Moses then returned to the Hebrews, and persuaded them to make a dash of safety from Egypt. Once beyond the borders, he led them eastward to Sinai, and had the Hebrews officially covenant with Yahweh to become their god, on condition that they would become his people. Yahweh was a god of wandering shepherds; his *mishpat,* or customs (ordinarily mistranslated as "justice" in the King James version of the Old Testament) included that ideal of universal tribal brotherhood so necessary to the existence of wandering shepherds; and a general opposition to agriculture and all city things.

Moses did not even know the name of the new god, at first:

> And Moses said unto God, Behold, when I shall come unto the children of Israel, and shall say unto them, The God of your fathers hath sent me unto you; and they shall say to me, What is his name? what shall I say unto them? And God said unto Moses, I AM THAT I AM; and he said, Thus shalt thou say unto the children of Israel, I AM hath sent me unto you. (Exodus iii:13, 14.)

I AM THAT I AM, of course, was Yahweh; the device sounds faintly like the ruse of Odysseus, when he has the Cyclops tell his kinsman, "*Oudeis* (No One) has hurt me." Two chapters later, the covenant is phrased even more definitely.

The primitive Yahweh was a magnified man, and nothing more. His voice was heard, as he walked in the garden at the cool of day; he ejected Adam and Eve from Eden, not because they had sinned, but because they knew good and evil, and might eat of the tree of eternal life. Yahweh talked at various times with men; he smelled the sweet savor of the sacrifice. He had been a hunter; for he set his bow in the clouds. His back parts alone could be seen by Moses (Exodus xxxiii, 23). These and other references indicate that he was conceived merely as a man or superman. Led by this primitive god, the Hebrews assaulted Canaan. They captured the hills, but could not take the valley strongholds, whose inhabitants had chariots of iron. The judges were primarily hill men; Saul's tiny kingdom was in the hills.

Meanwhile, numerous energetic spirits among the Hebrew youth had passed down into the valleys, and mingled peacably with the urban agriculturists there. This meant forsaking Yahweh and his shepherding, and adopting farming, city ways, and the valley *Baals* (meaning originally master and owner, and therefore also god). Vigorous reactionary Hebrews, called *nevi-im* or shouters, the word translated as prophets, sternly denounced this continuing apostasy of the Hebrew youths.

David, the second king, shrewd in statecraft, established his capital in the ancient Jebusite stronghold of Jerusalem, a valley city. He amalgamated the Jebusites with the Hebrews; Solomon carried this further, using many Canaanite cities as administration headquarters. This meant the adoption of city and farming ways; and meant one of two things in worship: the acceptance of the city and farming Baals of Canaan, or the alteration of Yahweh into a city and farming Baal. Both took place at first; Israel sacrificed to the Baals in the "high places," or primitive altars, and altered Yahweh into a god of imperial civilization.

One of the forgotten dramatic clashes of all history was when this imperialistic Yahweh's armies, under David, swung in a vast crescent southward, exterminating everywhere; and came at last to the Kenites under Mount Sinai—a race who had stood still, still worshipping the original pastoral Yahweh. A tense meeting between the vast empire and the small tribe, both claiming to worship Yahweh: but, by now, what differing Yahwehs! Then the red-handed empire swept on; the Kenites were gone, with a small group of them still permitted to live under the protection of the Hebrew empire. The popular uprisings during the reigns of David, Solomon, and their successors, were caused by kingly denial of Yahweh's primitive *mishpat,* or customs. Israel split over this; Judaism grew out of this.

THE PROPHETS, AND LATER JUDAISM

The first of the great shouters, preachers, or prophets, arose during the reign of Ahab, to curse the king for taking a peasant's land, contrary to Yahweh's *mishpat.* Then came the tremendous procession of iron-throated insurgent preachers, commencing with Amos in the 8th century B.C., and his stern cry,

> Let *mishpat* roll down like waters, and righteousness like a mighty flood!

If Israel refused to return to Yahweh, the preacher cried, then Yahweh would punish his people with dreadful dooms. They jeered at him, at first, as if he had been a lunatic. A god punish his own chosen people? Hosea followed, a gentler reactionary: for all of them were reactionaries, urging Israel to turn its back on civilization, and reenter the race's childhood, barbarism. Then the first great doom came, and in captivity the ten tribes disappeared forever. Only little Judah was left.

Isaiah came, and Micah, and Jeremiah, and the wild rest, desperately fighting at all times against the rival school of royal prophets, who insisted that Yahweh was a city and farming Baal; and that great punishments would follow if Israel returned to worship of the hill god. Which prophets were right? The people knew only one test: namely, which set of prophecies came true. Misfortunes came, as predicted by the insurgent prophets. Judah was harried away into the Babylonian captivity. Events had proved that the insurgent prophets were right; or, to word it more accurately, their teachings were accepted as right, when the misfortunes they had predicted came true. It was during and after this captivity that the Pentateuch, the Five Books of Moses, were put into final form—filled with myths, taboos, and priestly laws taken from Babylon, and all centered in one theme: that Israel must repudiate civilization and return to barbarism; that shepherding is moral, and agriculture and city life immoral.

Thus the otherwise inexplicable Cain-Abel story was thrown back into the time of Adam; God unreasonably blessing Abel's sacrifice of a lamb, and unreasonably disliking Cain's sacrifice of the first fruits of the field—mythical history taught for the sake of enforcing a moral. The moral was, that Yahweh approved of shepherding, and disapproved of agriculture. Cain, the murderer, built the first city; one of his descendants, Tubal-Cain, was the first metal worker; after the flood, men built "a *city* and a tower" named Babel, not merely a tower, and God destroyed this; Sodom and Gomorrah, wicked cities, were destroyed; and the Amorites, who dwell in the cities of Canaan, were everywhere described as wicked.

The amazing oath of the Rechabites, a family tracing back to primitive Kenite ancestry, sums up the Yahweh attitude of the reactionary prophets:

> Ye shall drink no wine . . . neither shall ye build house, nor sow seed, nor plant vineyard, nor have any; but all your days ye shall dwell in tents; that ye may live many days in the land where ye be strangers. (Jeremiah xxxv: 6, 7.)

Hosea had cried, in Yahweh's name,

> I will yet again make thee to dwell in tents.

Back to barbarism: and the Old Testament primarily a book of propaganda toward this end, edited for moral purposes. Thus there is no history of any king of the ten tribes of Israel, as opposed to the two tribes of Judah; since Israel had been exiled when the historians write, she must have been wholly sinful; and even her greatest kings are sternly adjudged to have been sinners.

But the conflict could not leave even the primitive Yahweh the same. The city-farming Baal-Yahweh was tremendously attractive to the Hebrews; the stern old mountain firebreather and blood-letter must, to win converts, be given features as popularly attractive and appealing. So in the conflict the insurgents modified the primitive Yahweh into an ever more and more appealing deity, a god of love, or universal brotherhood, a prince of peace—this of Yahweh, god of battles! The greatest prophet of the exile, the anonymous genius called Second Isaiah, saw that the whole people must be its own Messiah, or "anointed one;" must be the

> light unto the Gentiles, that the Lord's salvation may be unto the end of the earth.

While this Isaiah preached this radiant promise, Kung-fu-tze in China was vainly begging some prince to let him put his theories into practice; Lao-tze was meditating upon his frozen Tao; in India, Siddarta Gautama the Buddha and Mahavira the Jina were counselling passive yielding to Nirvana, to a living death. Despair, infinite despair: and the homeless Hebrew captive in Babylon crying,

> Fear not, thou worm Jacob. I shall help thee, saith the Lord. Behold, thou shalt yet thresh the mountains, and beat them small; yea, thou shalt make the very hills as chaff.

Then came the release, occurring piecemeal under Cyrus the Persian and his successors. Judah was done with kings; an equally leeching class, the priests, ruled henceforward. As happened in the case of all religions, ritual took the place of righteousness: extensive sacrifices, endless mumbling of prayers, became life's highest practical virtue. Successive rigid groups of priests and rabbis wrote the great Hebrew commentaries, the Talmud and the rest. Judaism became ritual: the formalized belief of a race homeless still over earth's face, and bound still by that white light of faith in its heart, that the day would yet come when they would thresh the mountains, and make the very hills as chaff. The homeless Jew has risen to control of much of the world's commerce; he shines in the literatures, the diplomacy, the cultures, of many lands: but his homeland is largely a cipher in culture.

One feature of Hebrew religious thought gave birth to another great religion—the idea of the *goel*, a man who "redeemed" or "bought free' a needy relative who had been sold into slavery for debt. Jeremiah and Isaiah applied the redeemer idea to Yahweh: he would redeem Israel from captivity. The old narratives were now filled with dramatic redemptions, as in the story of a pharoah's downfall in the Red Sea, a thousand years before. Hosea, Psalms, Lamentations, picture Yahweh as the redeemer: and now a breed of young religious reformers, outraged at the combination of foreign control in the hands of Rome and others, and of hateful rigid priestly rule beneath the wing of the foreign tyrant, arose in Judea. In the end Rome fell: but the Hebrews, and Judaism, did not fall. The old promise still sings in their exiled hearts: Yahweh will still come to redeem his people, and to make them to dwell again in tents.

ADDITIONAL READINGS

The Old Testament, especially in the King James version, is easily obtainable.

The Sociology of the Bible, by Lewis Wallis (Chicago), is the clearest statement of the making of Judaism out of primitive Yahweh-worship.

A Short History of the Jews, by Dean Milman, is one of the readable brief accounts of the long activities of this memorable race.

Jehovah, by Clement Wood (New York, 1920), is an epic treatment of the clash between Kenites and imperial Hebrews at the time of David; and of the growth of the idea of Yahweh.

The Beginnings of History According to the Jews, by Dr. Charles Prosper Fagnani (New York, 1925), is a brilliant scholarly translation of the first eleven chapters of Genesis, with ample explanatory notes.

V. THE RELIGIONS OF CHRISTIANITY

JESUS OF NAZARETH

Orthodox Christians believe that Jesus was the veritable son of God, miraculously conceived in the womb of a virgin, Mary, who was espoused to a good man, Joseph. The history of the period is blank about his birth, life, and death; the New Testament written about a century after the date ascribed to the crucifixion, is full of details, amplified by the apocryphal books of the New Testament, some of which are as old or older than the canonical books.

Jesus—we shall speak here from the orthodox Christian viewpoint—was the son of the virgin Mary, who later married the carpenter, Joseph. As a child, he learned the Hebrew sacred books, and took to carpentering. The idea of a redeemer grew strong in him. At length he left his home, fired by his religious zeal, and met with a desert zealot, called John the Baptist, who baptized the young Nazarene. Jesus became himself a wandering preacher and miracle-worker, healing the sick in body and mind, and even bringing the dead back to life. Hundreds of converts followed him around; and, while he stated that he came, not to destroy, but to fulfil, the old prophecies and laws, from the beginning he taught his own high gospel of restraint.

This was a doctrine amounting to anarchy, the Reverend Charles Stelzle says. It taught men to take no thought for the morrow; to lay up no riches on earth. It was a doctrine of pacifism: turn the other cheek; blessed are the peacemakers. It was a doctrine of sexual restraint: do not look upon a woman to lust after her, for that is adultery. It was a doctrine for the lowly: the meek shall inherit the earth. It was a doctrine putting love of Jesus ahead of earthly ties: a man must hate his father, his mother, wife, sister, brother, children, and his own body, to be a true Christian. It was a doctrine of high love: love God; love thy neighbor as thyself.

It was a doctrine based upon the Golden Rule: Do unto others as you would have them do unto you.

Jesus scoffed at the vain ritual of the orthodox priests; and, in the end, to end the menace of his liberal teachings, they destroyed him. A bribe of the High Priest to the follower of Jesus, Judas, caused the betrayal of the master; Jesus was arraigned before the Roman governer, and returned to the priests for sentence, and ultimate crucifixion. Moreover, orthodox Christians state, after three days Jesus was resurrected again from the grave, and after a brief further ministry on earth, he ascended into heaven, leaving ringing in the ears of his followers,

> Go ye into all the earth, and preach the gospel to every living creature.

THE EARLY CHRISTIANS

After his death, his hounded followers banded themselves together into little communist groups, sharing their all, and expecting the immediate return of Christ, and the Judgment Day. Saul of Tarsus, a Jew who was also a Roman citizen, persecuted and harried these followers. And then, the orthodox Christians say, a miracle occurred to Saul: he saw Jesus in a vision, and became at once converted to Christianity. He changed his name to Paul, and began to preach a religion akin to the savior-god myths of Osiris, Tammus, Attis, Adonis, Orpheus, and Mithra—those mystery sects already flourishing in Rome.

Paul substituted for the original idea of good works, as a necessity for salvation, the more easily acceptable doctrine of faith as the chief essential. He was decidedly antagonistic to women, ordering them to be subservient to their husbands, and decreeing that they must not speak in the churches. Marriage he did not favor, holding complete continence a higher state for man or woman; but, to prevent excessive sexual desire, he permitted and advised marriage.

This evangelist, Paul, took his altered Christianity throughout Cilicia, Galatia, Macedonia, the Mediterranean islands, and even to Rome itself. Before Paul, Jesus had remained a Jewish messiah; Paul, citizen of Rome, made him a redeemer for all mankind; substituting a religion about Jesus for the religion of Jesus. Jesus was a prophet, and a dreamer of vast dreams, and was, in the eyes of orthodox Christians, the son of God himself; Paul was an organizer and a builder of a church organization linking the Roman world together into a vaster mystery worship. In the end, in 67 A.D., after a wandering life of persecutions and successes, Paul died a martyr's death in Rome.

The majority of the new converts had been pagans; they brought many of their pagan practices into the new faith. The Gospels could not have been written, in their present form, by the apostles; for they are in Greek, and do not purport to be translations. The oldest, scholars say, the Gospel of St. Mark, was probably assembled about 65 A.D. The last of the gospels, that of St. John, with its emphasis upon the neo-platonic or New Plato-follower's idea of god as the *logos* or creating word, dates from about 100 A.D. The church, especially with the added element of a promise of eternal life in heaven for its followers, with bliss above to compensate for all earthly sufferings, attracted most the oppressed slaves, women, and others of the lowly, and became the most populous faith within the empire. It met secretly, often underground; its members refused to support the ideas of the Roman empire, opposed military service, the theater, the gladiatorial games, and, worst of all, in Roman eyes, refused to worship the emperor as god. Its members were falsely accused of unspeakable orgies in their secret meetings (based on the *agapa,* or feasts of love, of the Christians, commencing with the kiss of brotherhood); and of dreadful rites, including slaying of pagan children and even cannibalism, in their secret communion service.

Local oppressions began; then systematic persecutions. Nero first persecuted the sect, on the false charge that it had set fire to Rome, probably to cover his own mad guilt in this; other emperors persecuted it on religious and political grounds, culminating in the dreadful persecutions of 303 A.D., when the churches were razed to the ground, the available copies of the gospels and epistles destroyed, and the Christians martyred by wholesale. Within a score of years, a politically shrewd emperor, Constantine, seeing that force could not destroy the faith, tried diplomacy. He became a convert, and made the empire Christian, in name at least. What he actually achieved was to imperialize Christianity.

ROMAN CATHOLICISM

The faith became institutionalized, and degenerated; for a thing of the spirit cannot be institutionalized. Wild schisms or disagreements arose: was God (father, son, and holy ghost) one person, or three? Was the divine Christ and the human Jesus one person, or two? If they were one, and had formerly been two, when had they blended? Was Jesus as old as God the father? Why would a god need to sacrifice his son, for the sins of his own created creatures? Were the gods of the Old Testament and the New Testament one god, or in reality two?

By rigid enactments, followed by hideous persecutions of dissenting Christians, the church councils settled these disputed points. Sects of Christian eunuchs arose; the world-wide Christian ideal became the half-crazed emaciated hermit of the desert, never washing any part of his body, and with all human affection torn ruthlessly from his heart, advocating utter continence as the great Christian virtue. These stood against all social ties and civilization; their teachings, if universally followed, would have ended the human race in one generation of barbaric weltering.

This Christian type was followed by the idea of the Christian warrior, emerging during the Crusades. Meanwhile, the East had four patriarchs, and the West only one, the Pope of Rome. The Eastern church split off, on the question of graven images: the Eastern, orthodox, or Greek Catholic church celebrating its worship before painted ikons, the Western or Roman Catholic, before statues of Jesus, Mary, and the saints. The Pope of Rome now announced himself as the head of all Christendom. Pagan festivals became Christian holy days. The Roman Parilia in April was altered into the Festival of St. George; the Celtic midsummer orgy became the Festival of St. John; the August holy days of Diana grew into the assumption of the Virgin Mary; the November Celtic feast of the dead was reborn as Hallowe'en, or All Souls' Night; the winter solstice, December 25th, then celebrated as the birthday of Mithra, became the birthday of Christ, Christmas; the spring rites of the death and rebirth of the mystery gods became the Easter rites of the crucifixion and resurrection. Pagan gods became translated into Christian saints; relics alleged to be derived from them or the true cross were sold as fetiches the length and breadth of Europe.

The popes were not always men of blameless lives. We have glanced, in Book I: *The Outline of History,* at a few of the outstanding great popes, and a few of the ones men call evil, who offended Christian morality in countless ways. The church became incredibly wealthy, and muddied with wholesale bribery; at times the papal chair was sold, as the imperial throne had been sold at times, to the highest bidder.

More terrible than Christian immorality was Christian zeal. All of the sadism, or love of inflicting punishment and suffering, in human nature, came to the forefront in such hideous institutions as the Christian Holy Office, or Inquisition. A fiery zealot like Torquemada or the Duke of Alva inflicted more human suffering than a score of Herods. Monkish orders, the Dominicans, the Franciscans, the Jesuits, founded with high ideals, degenerated into wealthy organizations, ridden with immorality and un-Christianity. No torture was too terrible to be done in the name of the gentle Christ; where the Inquisition was strong, the land grew sick. Spain grew small of this disease.

THE REFORMATION: THE PROTESTANT SECTS

Then men turned again to the Bible, sick of the oppressive church: and the Protestant Reformation swept Europe. Huss, Zwingli, Wyclif, Luther, Calvin, Wesley, Fox, and scores more, summoned men to a religion anarchic in the highest sense: for in theory the highest of these faiths taught that no man or organization of men could dictate what a man's religion should be; but that the light within, the conscience, the in-dwelling God, alone could determine each man's religion; and that every man was entitled to define his religion for himself. This was the highest stage; the lowest was the Church of England, the Protestant Episcopal Church, which was largely the Roman Catholic Church translated from Latin into English, with the office of pope abolished. Some of these faiths were more rigid than Catholicism: Scotch Calvinism or Presbyterianism, with its terrible doctrines of predestination to hell and infant damnation, was in fact a morbid devil worship. The Protestants tortured and persecuted too; but mankind was stretching toward maturity, and the utter sadistic savagery of the Inquisition or the Roman Catholic massacres in the Netherlands was never quite equalled by the bloodiest Protestant Torquemadas.

Christianity is the avowed religion of a third of the world today. Not the Christianity of Christ, ascetic, continent, anarchic: but the churchified Christianity, that broadens its ethics to regard industrial exploitation, prosperity, and financial success as virtues. It has had its magnificent men and doctrines; it has had the reverse.

If we credit the advances of Europe to it (while remembering at the same time that man's advance, which science made possible, has been fought bitterly by organized Christianity at every step), we must also mark to its discredit the things wrong with the European world: the bloody rape of the rest of the continents, the race-suicide of constant warfare, the degraded double standard of morality for the sexes, the social crime of poverty, the abiding injustice and cheapness of the average life, and its shrewd maintainance by those in control. Christianity . . . and one backward glance at the gentle zealot of Nazareth, preaching love of God, love of one's neighbor, scorn for ritualized worship, scorn for wordly success, and the coming of universal brotherhood. . . .

Religion, Fagnani says, means primarily worship: scrupulousness in everything pertaining to the gods. Both the prophets and Jesus condemned worship; demanding in its stead interhuman decency in behavior, individual and social justice and kindness. They and he were assailed for irreligion, for opposition to worship: and this was a just indictment. All their successors in zeal for humanity have encountered the same myopic opposition, based upon the easy attitude that worship is more important than right living. Yet general love, and its advocates, lift, an intermittently increasing flood, to wash the world toward a dreamed Eden of reality.

ADDITIONAL READINGS

The New Testament, especially in the King James version, is easily obtainable.

The Apocryphal Books of the New Testament, edited by Canon Donahue, or *The Lost Books of the Bible* (New York, 1926), give the needed supplementary material, of books omitted by later Christians from the orthodox canon.

VI. THE RELIGION OF ISLAM

A CAMEL-DRIVER SEES GOD

Out of the womb of the Arabian desert came the Semitic worship of Ishtar into Babylon—a worship that spread over the classic world. Out of the same womb came the Semitic worship of Yahweh, which still survives in Judaism, the actual parent of Christianity. Out of the same womb came one more world religion, the Moslem worship of Allah.

The religion of the Arabian desert, in the 6th century A.D., was nearly what it had been two thousand years before. It was still crudely animist: each tribe had its fetiches, rocks and trees and stars; the one uniting element being the worship of a black meteorite, the Kaaba, in the sacred city of Mecca. In 570 A.D. there was born, in this Mecca, a child named Ubu'l-Kassim, later called Muhammad, Mohammed, Mahomet, Mahound, and by a variety of other names, all meaning "the praised one," just as Gautama was called Buddha, "the enlightened one," and Jesus was called Christ, "the anointed one." This boy became an orphan, and learned to be a camel-driver, travelling long distances, his inquisitve ears open to pick up any snatches of religious talk wherever he went. He is said to have been an epileptic, as was Saul of Tarsus; some phychologists hold, from countless such examples, that religion is a result of a disease of the mind. This is no reflection on religion: perhaps the disease gives an especial sensitivity of the patient to truth, or at least to religious speculation, faith, and exaltation.

We know little of the youth of Muhammad; but it is clear that he earned the good graces of his employer, the rich widow Khadija, who married him when she was forty, and he twenty-five. He remained true to her until her death. His material needs satisfied by this marriage, Muhammad turned to speculations of a religious nature; primitive man's intense inbrooding seeking for not only the how of life, but also its why. He arrived at length at the idea of Islam, or submission to god, as the one way out of the bog called life. Not a mere earthly god of tree or stone: but the one great god over all the earth.

The patron god of Muhammad's tribe was called Allah; Muhammad gave the same name to his discovered god of the universe. He made his mission in life to win Mecca, the sacred city, to the worship of the one universal Allah. His first convert was his wife; his closest friends and relatives one by one accepted his strange teachings as true. All this had to be done in secret, for fear that the jealous priests of the Kaaba would stamp out the new heresy at its feeble birth.

At length Muhammad announced himself and his revelation. The fact that Mecca was a sacred city, a city of refuge, saved the prophet from assassination; but it did not save him and his followers from a general boycott, as a culmination of sharp quarrels and uprisings. Persecution strengthened the faith; at last, the baffled rulers of Mecca declared open war on Muhammad, driving him and his followers into a blockade in one part of the city. The starved Moslems at last surrendered: Muhammad had a tactful vision, by which Allah permitted worship of Meccan djinns and spirits.

The freed Muhammad repented of his weakness, announcing a revelation which said that the previous recantation had come from the devil. Persecutions commenced again. Muhammad, saddened by the death of his wife, fled to the oasis of Taif, and tried in vain to get converts. He was allowed to enter Mecca, on his pledge to attempt to convert no more Meccans. The wily reformer kept the spirit of his promise, using his persuasion on strangers in the city, the desert bedouins encamped there for the night. He told these of fragments he remembered of other religions: of Ibrahim, first of the prophets; of Ishmael his son, who founded Mecca; of Suleiman the magnificent emperor of Jerusalem; of Jesus, who had been born in a manger. And mostly of himself, the last of the prophets. At death, Muhammad said, the devout and pious Moslem would be taken to the great oasis of heaven, where he could loll at ease throughout eternity, eat and drink in endless comfort, and enjoy the sexual embraces of maidens perpetually revirginated. The sinner would be hurled into a horrid hell, through fiery sufferings until, on Judgment Day, he was utterly annihilated.

ISLAM SPREADS

Muhammad received an invitation from the oasis of Yathrib, inviting him to come and teach them. He sent back word that he would accept, if they would follow him in a Holy War throughout all Arabia. The alarmed Meccans violated their own faith, and appointed an assassination committee to end the dangerous heretic. When they entered the tent of Muhammad, they found that he had fled, and that his cousin Ali was in his bed. For days he skulked in a cave; and at the end of the *hegira* or flight ventured to enter Yathrib.

At first he sought to convert the few Jewish tribes in Yathrib, still waiting for their messiah. When they learned of his ignorance of the Hebrew religion, and of his increasing fondness for women, they rejected him. Rebuffed by this, Muhammad turned his persuasions on his own people. To build up his confiscated fortune, he organized highwayman expeditions, to plunder caravans. This at length developed into open warfare between the plundering followers of Muhammad and the townsmen of Mecca. When the battle took place, the physical weakling Muhammad waited beside swift camels far in the rear, which were designed to carry him far away if he lost. At the first clash of arms, and the sight of blood, Muhammad fainted. When he recovered, his forces had routed the enemy; and Muhammad rode back into Yathrib at the head of his troops, a conqueror at last. The name of Yathrib was changed to Medina, The City (of the prophet); and, instead of persuasion, from now on he gave death to all unbelievers. In Mecca he had taught that truth would crush falsehood; now he taught that misbelievers were to be held for ransom, or ruthlessly exterminated.

Mecca yielded; and Muhammad, the hunted criminal a few years before, returned as dictator. From the sacred city he sent armies to the four edges of the desert, to convert the unbelieving dogs, as he called them, or to end them. The northern strip of the desert was held by the Byzantine empire and Persia; Muhammad outfaced and defeated them too. The bedouin had always loved violence; Muhammad made violence the supreme virtue. Life demanded but one thing: Islam, or submission to Allah. More than the religious Christian orders, the Knights Hospitallers and the Knights Templars, the Moslems are forever an army of God on the warpath. In the mosques, the believers prostrate themselves with the mechanical regularity of goose-stepping Prussians on the march; the muezzin's call to prayer from his tall minaret is like the summoning alarm of a sentry on duty—a sentry of God.

In 632 A.D., ten years after the flight or Hegira, the prophet died, with the war just begun. In a quarter of a century, under his vigorous caliphs or successors, Arabia, Persia, Babylonia, Syria, Palestine, and Egypt had bowed down in submission to the crescent, the standard of Islam; half a century more, and the ranks of Allah had won all North Africa, and had crossed at Gibraltar and conquered most of Spain. Ten years more, and they were flooding into mid-France.

Today, twelve centuries later, Islam stands next to Christianity as the most flourishing religion in the peopled world—not the most numerous, but the most vigorous. Christianity came to a classic world already suffused with scepticism, that necessary first step to clear thinking and scientific progress; it dethroned thinking, art, and literature, and plunged the world back into an abyss of faith, which set the clock of civilization back a thousand years. Islam came to a Europe dimmed in the Dark Ages; and Islam came bearing arts and sciences readily grasped from the whole world. The course of history would have differed, but not necessarily for the worse, if the crescent had flown high in the groaning dusk at Tours.

For Islam is a great religion, speaking directly to the hearts of men. Its founder was a cistern of lust, a compromiser, a time-server, a charlatan. He was a strange blend of dreaming prophet and wily organizer: he was Jesus and Paul in one, with a spicy dash of Don Juan in his make-up. After the Hegira, policy dictated additional revelations as supplements to the Koran. His teachings embodied a glorious forth-giving:

> Let us be like trees that yield their fruit to those who throw stones at them. . . . One hour of justice is worth more than three score and ten years of prayer. . . . Bring then a better revelation, and I will follow it.

Toward the end, power, wine, women, rose to his head. Conversion was simplified to the repetition of *La illah il'allah, Muhammad rasoul allahi,* "There is no god but Allah, and Muhammad is his prophet;" and the payment of a tax. The great church-builder, on at least one occasion, descended to buying converts. Compromise went so far, that all the idolatry, the fetichism, the abasing worship of the Kaaba, became integral in the new religion. To this day, 200,000 pilgrims each year drag themselves, on foot or by camel, to kiss the black rock at Mecca, in an elaborate barbaric ritual. They return, the *hajj* or pilgrimage ended, wearing green sashes around their fezzes, symbols of that green oasis of heaven, flowing with wine and soft with the bodies of the ever-virginal houris, which they are sure they have earned by their journey.

When Islam reached India, its practice and faith were subdued to Hinduism, with asceticism predominant. The rosary, symbol of Shiva the destroyer, became a symbol of Muhammad, its ninety-nine beads standing for his ninety-nine names. From the Moslems, the Roman Catholic Christians took over this fetich. Islam itself split into many sects, more than seventy-two of which still exist; although these have not had that barbarous warfare that has badged many Christian sects.

Islam's highest peaks of culture were in reawakened Bagdad, and in Cordova, Seville, and other Spanish towns that its passing illuminated. The Seljuk Turks, the Ottoman Turks, at first degraded the worship toward their own barbaric practices; in the end, it raised them more. It even bettered the condition of women; for it replaced unlimited polygamy by permitting only four wives to one man—at one time, of course. It taught, more effectively than Christianity with its trinity or three-in-one deities, the oneness of god—*La illah il'allah;* it made a hundred scattered races one race, and led toward the realization of the oneness of mankind. Its worst gift was the fatalism that taught submission to one's fate, or *kismet:* for the free man builds his own fate. The crescent still dances in the ribald breeze, looking with envy at the banner of the blood-etched cross: from hour to hour the cry for the *jehad,* the holy war, goes forth . . . . Islam . . . *La illah il'allah.* . . .

ADDITIONAL READING

Adequate translations of the *Koran,* the Moslem Bible, are easily obtainable, in cheap standard editions.

VII. MORMONISM

THE LATTER-DAY SAINTS

To show how religions still bud and flourish, we might take such Christian sects as the Friends or Quakers, the Shakers, the Winnebrinarians, the Seventh Day Adventists, or the Holy Rollers; or such stranger sects as the grossly bearded members of the House of David; the resurrected Elijah, John Alexander Dowie, and his Zion City; the Christian Philosophers of Oakland, California, whose Bishop Casper practiced obstetrics by dancing about the room, and thus inviting the child to be born; or such offshoots of Hinduism as New Thought, Theosophy, and, blended with other elements, Spiritualism. The hold of older faiths has loosened in an increasing number of civilized men and women; many of these cling to new and often diluted religions or substitutes for religion, some of which include practices which cause frequent clashes with the police force. For the few sects listed above, out of the many flourishing in America today, there are as many in many foreign countries; and there have been as many, or more, in each century of the Christian era. Let us, instead, glance more carefully at a typical modern religion, Mormonism.

In Sharon, Windsor County, Vermont, on December 23, 1805, was born Joseph Smith, child of parents and grandparents highly superstitious and neurotic. His maternal grandfather had been an epileptic; young Joseph, as a child, was a distinct epileptic. In Manchester, New York, where the family had been transplanted, Smith (if we believe his revelation) at the age of eighteen was visited three times in one night by an angel named Moroni, who told him that the Bible of the Americas, the supplement to the New Testament, was buried in a nearby hill, Cumorah, now called Mormon Hill.

He told this in 1838; he had earlier, authorities say, told other stories. Four years later, he said, he dug up in this spot a stone box which held a volume made of thin gold plates, and fastened together by three gold rings. The plates were covered, he said, with writings identified as being in the reformed Egyptian tongue; there were also in the box a breastplate of gold, and a pair of supernatural crystal spectacles, named Urim and Thummim, by means of which the writing could be read. The Urim and Thummim, of course, had been the names of the stones on the breastplate of the High Priest, as told in the Old Testament; before this, they had been the two sacred dice cast in the bronze vessel called the ephod, by which the will of Yahweh could be determined. Smith, letting his friends write at his dictation, from behind a curtain dictated *The Book of Mormon;* after which, as Smith said, the angel Moroni carried away the gold volume.

In 1812, a man named Solomon Spaulding, a minister and iron-founder who became greatly interested in the prehistoric mounds of Ohio, wrote a romance, *The Manuscript Found,* to explain the origin of the mounds, and the Hebrew origin of the North American Indians—the theory that he believed in. Opponents of Mormonism claim that an early convert, Sidney Rigdon, while a compositor in a Pittsburgh printing office, made a copy of this, and that it largely guided Smith's *Book of Mormon.* Certainly Smith added some autobiographic material, and also took over bodily some of the illustrations and hieroglyphics of Egyptian manuscripts. Thus he mistranslated a picture of the dismemberment of Osiris by Set as being Abraham's offering Isaac for sacrifice to Yahweh; for at the time the hierogliphs had not been generally translated.

The Book of Mormon declared that Smith was God's prophet. It professed to give a history of America from its first settlement by a colony of Jaredites, a fragment of the peoples dispersed by the confusion of tongues at the Tower of Babel—this history of America running down to 5 A.D. These first settlers, in course of time, destroyed one another. In 600 B.C. Lehi, his wife, four sons, and ten friends, landed on the coast of Chile. Upon the death of Lehi, his youngest son Nephi received the divine appointment; his resentful older brothers were punished by receiving darker skins, and by becoming the idle, mischievous race of Lamanites, or North American Indians.

Between the Nephites and the wicked darkened Hebrews centuries of warfare ensued. The resurrected Christ appeared, founded a church, and sought to guide the Nephites, who nevertheless were almost exterminated in 384 A.D. in a battle at Cumorah Hill, Ontario County, New York. Mormon and his son Moroni, among the few survivors, collected the sixteen volumes of churchly records, compressed them into one book, and buried them, assured that God's prophet would one day dig them up. So, says the book, did Mormonism begin. Smith denied that the word *Mormon* derived from Greek *Mormo,* hobgoblin; he said it came from Egyptian *mon,* good, plus English *more*—more good. It is interesting to find Americanized Hebrews, in 384 A.D., speaking dead Egyptian and yet unborn English.

The early Mormons baptized each other as members of the priesthod of Aaron, and of Melchizedec, that strange pre-Hebrew anomaly in the Old Testament, described as being born without parents, yet serving the true Yahweh. The young convert Rigdon translated the Bible anew, inserting in Genesis 50 and Isaiah 29 prophecies of the coming of Joseph Smith, and of the nature of the Book of Mormon. The sect sought to escape its persecutions by moving to Kirtland, Lake County, Ohio; near here Smith and Rigdon were tarred and feathered. Smith's wide lusts almost broke up the church; Brigham Young, a Vermont painter and glazier who had joined the faith, kept it together.

In 1835, twelve apostles, including Young, were appointed, to proselytize or convert the gentiles. Three years later, the formidable Danites were organized, bound to secrecy under penalty of death. Their crimes and outrages shocked the countryside. In Missouri, where they moved, Rigdon in 1838 preached his war of extermination against those who disturbed the Mormons. A company of Danites routed Missouri militia; in retaliation, gentiles attacked the Mormons at

Hawn's Mill, and killed twenty of them in cold blood. The harried sect moved over into Illinois, and found here more trouble.

The Book of Mormon had forbidden polygamy, with a reservation allowing for subsequent revelations. On July 12, 1843, Smith had a revelation establishing and approving polygamy. Members of the faith established a newspaper, the *Expositor,* which exposed this, and attacked Smith for taking "spiritual" wives from other members. In retaliation, the *Expositor* office was razed to the ground. Joseph Smith, his brother Hyrum, and others were arrested for treason; a mob, on June 27, 1844, with the collusion of the militia guard, broke into the prison, and shot the two brothers dead.

Young and Rigdon fought for control of the sect. Rigdon failed, was tried for treason, and cut off from the church. He failed in establishing an independent Mormon Church in Pittsburgh, and spent his last years in Friendship, Allegheny County, New York. The family of Smith tried to secure control for Joseph Smith, son of the founder; then for James J. Strang, a Wisconsin convert, who at length settled on Beaver Island, Michigan, was crowned "King of Zion" there, and was killed by his followers there in 1856, when his kingdom broke up.

The Mormons under Young moved on in 1847 to the basin of Salt Lake, Utah, and here established their capital. The march across the continent was conducted with masterly efficiency. Meanwhile, missionaries in Europe sent over immigrants to swell the faith. The church was for years in conflict with the United States Government; it had intended to settle outside of our national territory, but the treaty of Guadalupe-Hidalgo, at the close of the Mexican War, defeated this aim.

Murder and sudden death at times marked the conflict with the Federal Government. An amusing judicial decision was rendered in the 1873 suit of Ann Eliza Young, Wife Number 19, whose claim for alimony was set aside by a judge on the ground that the marriage was void as being polygamous. Young died on August 29, 1877, leaving an estate of more than $2,000,000; 25 wives; and more than 40 children.

The total number of Mormons today is nearly 400,000, with many thousands outside of the orthodox church. Evangelical or missionary work is carried on throughout the United States and foreign countries, with some success. For theology, Adam, the first man, is the chief god; among his lesser gods are Christ, Muhammad, Joseph Smith, and Brigham Young. Plural marriage is justified because a woman cannot be saved, except by being "sealed" or mated to a saint. The Mormons believe implicitly in polygamy, casting out devils, in the near approach of the end of the world; and in the rulership thereafter of Christ and all the Mormons as the saints, in an earthly kingdom capitalled either at Independence, Missouri, or in Utah.

VIII. THE RATIONALIST POINT OF VIEW

THE EVOLUTION OF FAITH

The most vigorous critic of religion is naturally the rationalist, or atheist. Even the most religious person will gain by some understanding of the claims advanced by thoughtful disbelievers, especially when their high reputation for thinking in this and other fields is considered. "Ye shall know the truth, and the truth shall set you free," to use the words attributed to Jesus, lays the task upon the mind of attempting to ascertain what the truth is: and this can never be best obtained from hearing only one partial side of any question.

The rationalist says—and many of man's best intellects speak here—that there is no evidence anywhere of the existence of any god, or of any spiritual beings. He takes his text from almost any stage of man's enlightened thinking: whether from 12th century Averroes, the great Arabian thinker,

> All religions are false, although all are probably useful;

or from the Reverend Robert Norwood, of St. Bartholomew's Church, in New York City, an Episcopal clergyman who keenly and bravely stated,

> The difference between God and the gorilla is one of degree, and not of kind.

With scintillant penetration Lester Ward wrote,

> Religion must have been primarily an advantageous social structure, otherwise it could not have come into existence. . . . Probably most religions are now somewhat disadvantageous. Certainly the adherents of any religion would admit this of all the rest, and even exaggerate their disadvantageousness.

Comte pointed out that man passed through three stages:

1. The superstitious, or religious.
2. The metaphysical, or philosophical.
3. The positive, or scientific.

The apparent tendency of civilization follows this classification. Laplace, originator of that nebular theory of the origin of the universe which still bears his name, when asked by Louis XVI, "But what about God? Have you not left him out?" answered firmly, "I find no need, Sire, of that hypothesis."

What is the evidence for this hypothesis? We found that religion consisted in the belief in spiritual beings. The early evidence for this, furnished by reflections in a pool, shadows, echoes, dreams, trances, and death, is wholly explained by physics and the organic sciences today. Other subjective evidence, furnished by delirium, insanity, swooning, and epilepsy—as in such cases as Saul of Tarsus, Muhammad, Joseph Smith, and many more founders or reformers of religion—has yielded as fully to science. The sole objective proofs, of movement in inaminate objects, of slow exaggeration of the deeds of one's ancestors, and of the power of the phallus, are physical, sociological, and biological facts: but no one of them has even a remote tendency to prove the existence of spiritual beings. From our valley crest of today, we can see that savage man had no real evidence for the existence of god or spiritual being: and that no such evidence has ever been furnished, by any phenomena in the universe.

The world's religious practices, resulting from the error of belief in spiritual beings, Lester Ward summarizes as:

1. Self-mutilation, including castration, which Jesus implicitly recommended in, "There be some that have made themselves eunuchs for the kingdom of heaven's sake;" and which is common to many ancient faiths.
2. Superstition.
3. Asceticism, mortifying the body, including Oriental asceticism, Christian mysticism, and Puritanism.
4. Zoolatry—animal totemism.

5. Witchcraft, especially attributed to women, due to the mystery of childbirth.
6. Persecution of all dissenters.
7. Opposition to truth—still widespread, even among the more enlightened religions.
8. Obscurantism, or suppressions of books and writings, and censorship of the press. The Catholic *Index Expurgatorius* illustrates this.

If the religious forces of America succeed in their present campaign against the teaching of the facts of scientific evolution, scientists have pointed out that logically all the regular sciences will have to be excluded from the schoolroom; for all are permeated with evolution. The church has successively fought Galileo and Bruno in astronomy, Harvey's discovery of the circulation of the blood, Sir James Simpson's introduction of anesthetics, sanitation, gas lighting, railroad travelling, winnowing machines—even the lightning rod.

"THERE IS NO GOD"

If it be thought that this rationalist protest goes against the churchification of religion, rather than against the essential religion itself, the answer of the rationalist is not wanting. There is no evidence of mind in the universe, until we reach man and his immediate predecessors. As Lester Ward phrases it,

> Mind is found only at the end of the series, and not at the beginning. It is the distinctive attribute of the creature, and not of the creator. It resides in man, and not in nature.

As we have seen, the method of mind is the precise opposite of the method of nature. Nature, with unlimited resources, produces an enormously redundant supply, trusting the environment to select the best. The survival of the fittest involves the sacrifice of the great majority—a method in the highest degree wasteful. The only true economy is purposive; only mind has purpose, or knows how to economize. Mind alone sees the end, and pursues it. Thus mental phenomena are far more rapid than pre-mental natural phenomena. It took more than 5,000,000 years to alter the 4-toed eohippus into the one-hoofed horse; in a generation, mind has invented and perfected the steamship, railroad, telephone, airplane, radio, and countless other factual miracles.

The rationalists say that men classed as scientists, who attempt to reconcile science and religion, limp woefully in their arguments. God is now regarded, either as the ether, or as the artificer of the electrons and protons within the atom: yet this is after all a misuse of words. Ether, atom, proton, and electron are definite things; there is no reality in labelling these with the name "god," which means a spiritual being, and, in civilized eyes, one equipped with some purposive or at least mental qualities. There is no evidence in ether, atom, proton, or electron, of either of these; they can not properly be called god.

Each religious belief, rationalists say, on examination, seems absurd. Lecky calls attention to the absurdity involved in the Christian communion service—that Jesus, seated at table, took his own body in his hands, blessed it, broke it into bits, handed it to his disciples, saw them eat it, and then walked, uneaten, out into the garden; and that we today may eat the actual body and blood of Jesus, like modern cannibals. The resurrection of the body, that fluidic caravanserai for travelling particles of the material environment, is as scientifically absurd. Infant damnation and predestination to hell are more than absurd: they are damnable lies, Lecky says, being "in fact devil-worship named Christianity."

Spencer relegated God to the permanently Unknowable: which is to crowd him off the table entirely. And when it is noted that each race clothes God in its own face, and expresses in him its own desires, the matter becomes increasingly suspicious. Serene Greece and Palestine produced serene gods; India, lashed by hurricanes and earthquakes, terrorized by wild beasts, had four-handed Vishnu, five-headed Brahma, four-armed Kali, with her belt and necklace of ghastly severed human heads. Mexico, Peru, Egypt, had similar things of terror for worship. Gods grew out of man's fear of the misunderstood environment: "the fear of the Lord is the beginning of wisdom."

The doctrine of immortality, keystone of the Christian religion, has exerted, Ward says,

> an exceedingly pernicious influence upon the progress of thought, of knowledge, of material civilization.

Belief in heaven dampens man's ardor for bettering earth; the oppressed suffer earthly hells, believing in the lie that some heavenly oasis will right their wrongs—a vain delusion, fostered by those shrewd earthly overlords who profit from the wrongs. Man today is mature enough to be better off with no religion; the time has passed when he had to raise the illusions called gods, like umbrellas, to shade his eyes from the dazzling glare of truth.

It was no accident that the leading founders of America, Thomas Paine; Thomas Jefferson, who called Christian clergy celebrating the communion service "cannibal priests," and who found no single redeeming feature in Christianity, which he called "our superstition;" John Adams, who said,

> This would be the best of all possible worlds, if there were no religion in it;

George Washington, tactful lifelong disbeliever; shrewd, hard-headed Benjamin Franklin; gentle Abraham Lincoln, rationalist and atheist from the age of twenty-nine to his death, despite churchly claims made in his name afterwards; and Ulysses S. Grant: it is no accident that these outstanding Americans were all disbelievers of one sort or another.

The Old Testament is a priestly editing of early documents, to twist Israel away from farming and city life, into nomadic shepherding:

> I will yet again cause thee to dwell in tents, O Israel.

Its god is unjust, malevolent, unspeakably bloody, and so weak that, wrestling all night, he could not throw a man; a promulgator of superstition-ridden laws, an exhibitor of his back parts to Moses.

Jesus, with his strange preachments upon sex, that lust for a woman constituted adultery—not fornication; that castration, or making one's self "a eunuch for the kingdom of heaven's sake," was the highest state for Christians; that those worthy of entrance into heaven did not marry on earth— the actual reading in the Gospel of Luke; and that one should hate his family, again using the words of Luke: Jesus, as these and many other statements indicate, was a severe sufferer from what Freudians call the Oedipus complex. He had an intense affection for his mother: the apocryphal New Testament has the angels announce that Mary will be "a holy virgin for one husband, Christ;" and calls Christ "her spouse and bridegroom" constantly. Christ, in the orthodox New Testament, often called himself "the bridegroom," without naming the bride: the censor, within himself or the editors of the gospels, was at work here.

It is true that Jesus sought to wean himself from this influence, according to Jung's "struggle against the terrible mother-monster;" his contemptuous references to his mother establish this. He never entirely succeeded. Moreover, his whole anarchic teaching—take no thought of the morrow, lay not up treasures upon earth, and all the impossible rest—came from the struggle against the ideas of his putative father, the hard-headed, practical-minded and practical-faithed Joseph. That even early Christians regarded Joseph as his father is established by the double genealogies of Jesus, both tracing his descent through Joseph, with no genealogy tracing him through Mary.

This analysis holds good, whether Jesus ever existed historically or not. If he did, he has been analyzed as a twisted, perverted mentality, ridden by the Oedipus complex; if he did not, the analysis of the fictional character has analyzed correctly the twisted psychology of the inventors of the Jesus story. In any case, the perverted teachings of the sinfulness of physical love between man and woman, and the extollation of emasculation, would end the human race, if universally followed, in one generation; the anarchic teachings, if followed, would plunge the world back through barbarism into the social suicide of savagery and animalism. The Old Testament would send man back into nomadic shepherding; the New Testament would return through savagery into death for the human race.

Christianity has never been remotely put into practice, except in strangely persisting cults like the Skopsi, the existing "White Brethren" of Russia, who still practice primitive communism and general emasculation of all male converts, continuing to exist by attracting new converts. Each Christian sect has twisted the original teachings into something flattering to its own particular desires. The same is true of all religions. The case for religion, in the light of modern science, is a thin one: its totality approaches nothing.

Perhaps, the rationalists say, man has matured enough to do without religion entirely: to pass through the philosophical stage, into the brighter maturity of the scientific stage of culture. There will always be illusions: but the primitive god illusions are yielding with increasing rapidity to philosophical and, today, scientific illusions, or closer approximations to that banned reality, truth, whose shadow alone is bright enough to be man's only salvation.

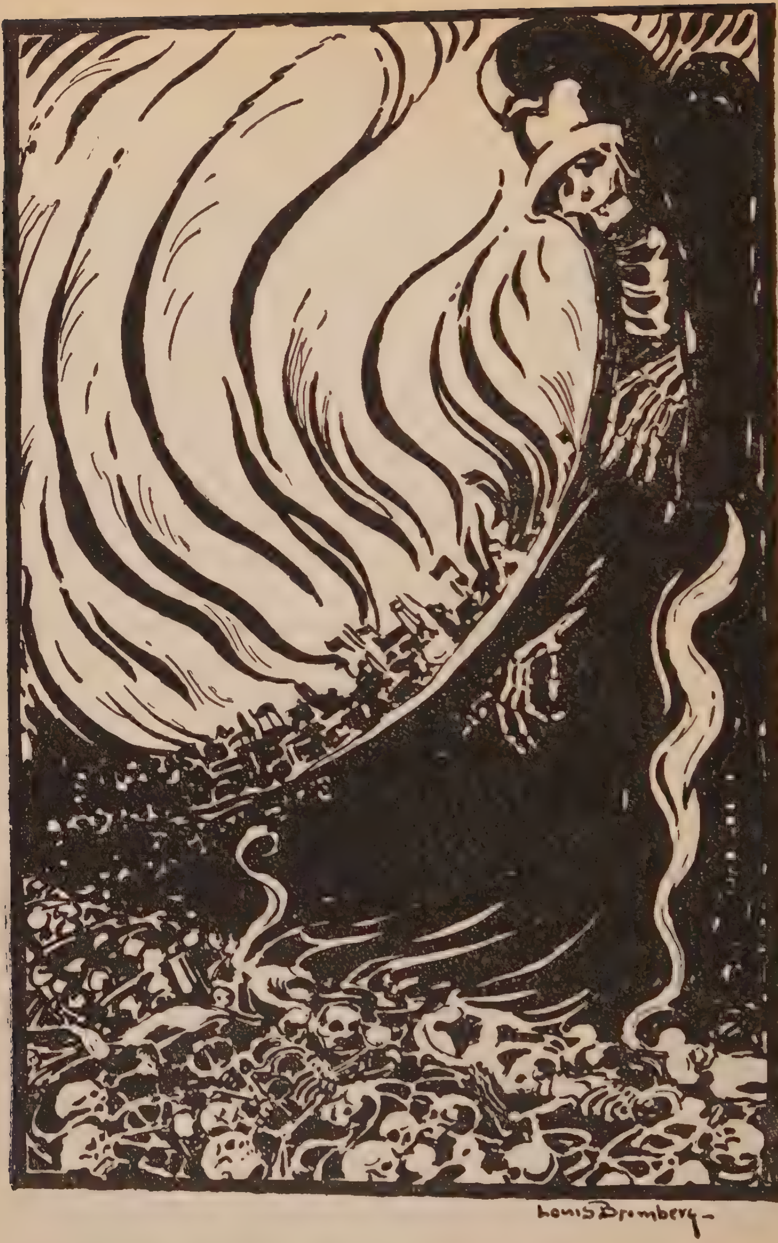
ADDITIONAL READINGS

The works of Lester Ward, Sir James Frazer, Comte, Spencer, and Lewis Wallis are only a few among many splendid analyses of religion.

The eloquent orations of the American agnostic, Robert G. Ingersoll, should be read for splendid contributions to the rationalist's point of view. The Englishmen Charles Bradlaugh and Robert Blatchford wrote brilliantly on the same theme.

Six Historic Americans is a collection of the writings of Thomas Paine, George Washington, Thomas Jefferson, Benjamin Franklin, Abraham Lincoln, and Ulysses S. Grant, upon rationalistic subjects.

Pagan Christs, by J. M. Robertson (London, 1911), is an exhaustive scholarly study of non-Christian origins of Christian beliefs and observances. It traces everything but the ideological peculiarities of Christianity; these are dealt with in *A Psychoanalysis of Jesus*, by Clement Wood, (1925).


Louis Bromberg

"Hate one another!" chuckles War.
"I am death's grossest servitor,
Teaching dumb man the swift way
To couch forever with cousin clay."

BOOK VI

THE OUTLINE OF PHILOSOPHY

I. GREEK THOUGHT

GRECIAN PHILOSOPHY BEFORE PLATO

On the southern shore of the Latmic Gulf, which plucks its way into Asia Minor, near the mouth of the leisurely Meander River, lies an uninhabited marsh. Go back 3,400 years to the same spot, and you find settlers from the Greek town of Pylos landing, massacring all the inhabitants of the old city there, and building themselves a new coast town, with four wide harbors. Flow with the unreal stream of time almost a thousand years: and this coast city, Miletus, has established more than sixty other cities, including Abydos, Cyzicos, and Panticapeon. Two hundred years more, or 500 B.C., and Miletus has become the great city of the Grecian world. Greek thought awoke here; philosophy, in the persons of Thales, Anaximander, Anixemenes, and others, originated here. Persia took the town: it headed the Ionian revolt against the Iranian overlord, only to meet a massacre of most of its citizens, and an exile of the rest. Lessening vitality, more conquests, including the final one by nature: and the site of the bright splendor is today a marsh. Philosophy for ages shone with a bright splendor: and today it is not greatly different from a marsh, although still inhabited by living wraiths of dead errors.

Philosophy is that branch of sociology which attempts to form a synthetic picture of phenomena in their largest possible aspects. It is not correct to say that science is the analytical description of facts or phenomena, and philosophy their synthetic interpretation. Science we have found to be a systematic reasoning about facts; and this includes analysis, or isolating and tearing down complicated thoughts and phenomena, as well as synthesis, or building up comprehensive generalizations covering a multitude of phenomena. There are no problems which science omits; it deals with good and evil, beauty and ugliness, order and freedom, life and death, as surely as it deals with the compound eye of a fly, or the veining of a violet leaf. If philosophy dealt only with phenomena not open to the methods of science, it would today have no field to deal with. It is true that philosophy has preceded science, in every field of scientific thinking; as in turn religion preceded philosophy, in the same fields. Philosophy today still has its double role, as we shall see: but its significance has largely gone. The best definition of philosophy is that it is that branch of sociology which deals with the largest possible generalizations concerning phenomena.

Academic minds divide philosophy into five divisions:

Logic, the study of ideal method in thought and research.
Esthetics, the study of ideal form, or beauty.
Ethics, the study of ideal conduct.
Politics, the study of ideal social organization.
Metaphysics, the study of ultimate realities.

Four of these five academic definitions are faulty: the branches of philosophy are not limited to ideal forms, but study all forms, some philosophers seeking to build from these the ideal forms. Logic is a branch of psychology, as we discovered in Book II: *The Outline of Science;* esthetics, ethics, and politics, as we learned, of sociology; metaphysics properly belongs to the inorganic sciences, and indeed to science as a whole. None is the domain of philosophy exclusively. The two precise functions of living philosophy we shall arrive at: for the present, we will survey the field from the beginning, and see how its masters interpreted its function.

The earliest Greek philosophers knew by intuition, or intuited, that the universe was monistic, or formed of one substance: this, as we have seen, is one of the most recent discoveries of science. Modern science has discovered this original element to be energy—electrical energy, in its double aspects of matter and energy. The early Greeks, feeling that there was one root element for everything in the universe, suggested many substances as the original one. Thus Thales of Miletus, born about 636 B.C., asserted that everything came from water. The blood of animals, he pointed out, was watery; plants cannot live without it. He was a naturalist, studying natural substances, and a materialist in his philosophy; but chemistry had not yet told man that water is simply a combination of two gases, hydrogen and oxygen.

Anaximenes, also from Miletus, his life stretching from 590 to 480 B.C., said that the universal substance was air; since our souls are composed of air, or spirit. He felt that air pervaded the universe. The scientist today has measured the exact gaseous components of air; and has assumed a wider substance, ether, to fill the immense reaches of the starry cosmos. Anaximander of Miletus, born a quarter of a century after Thales, said that some unlimited and infinite substance was the essence of all things: but he would not define it beyond calling it the principle of all change, of all becoming and passing away: the "that" out of which the gods and worlds arise, and into which they ultimately return. The Persian menaced: change was in the air. Heraclitus, almost an exact contemporary of Anaximenes, living in Ephesus slightly to the north of Miletus, said that the moving spirit of all things was fire—not flame, but heat, the principle of fire; and that everything in the universe changed; that nothing was permanent. Change was in the air. . . . Heat is not far from energy, the present scientific answer; but the conclusion of Heraclitus was based upon thinking, as it were, in an easy chair, and not upon laboratory investigation.

Pythagoras, who was born in the 6th century B.C. on the little island of Samos, near Miletus and Ephesus, and afterwards moved to resplendent Crotona in Magna Graecia, or south Italy, conceived the essential nature of things to be number. He was one of the founders of mathematics; the discoverer of the proportion in musical harmony, as we have seen in Book IV: *The Outline of Art;* and he originated a semi-religious sect believing in immortality and the transmigration of souls. Anaxagoras, who lived between 500 and 418 B.C. in Clazomenae in central Asia Minor, and afterwards took himself to spacious Athens, that waxing crescent of all Hellas, taught that all things were eternal: but that infinite intelligence was slowly sorting them out into order.

Acropolised Athens seemed eternal: her confluence of the greatest Grecian minds was slowly sorting order out of chaos. "The Infinite Intelligence was the architect of the Infinite Matter," Anaxagoras taught; thereby in essence stating that the original substance of the universe was god, or mind. So these six early thinkers gave water, air, change, heat, number, and mind or god as the original single substances in the universe. The first object sought by philosophy was the original element out of which the infinite multiplicity of things evolved.

Parmenides, born in Italy in 536 B.C., confined his speculations to the two kinds of thought: those from sensory impressions, and those obtained from the reason. The first, he said, taught change; the second taught that change was illusion. He held that the reason alone was right; and that nothing changed. A strange antedating of the conclusions of Einstein and Ouspensky! The changed philosophic attitude was in the air. No longer did philosophy ask, How did the universe come to be? For each man could give his own answer to this, in this dim hour before science began to mature; and no one could establish that his answer was correct. The new question was, How does man know about the universe? How does the human mind function?

The first question was later to be answered by the inorganic sciences; the second clearly belonged to the field of psychology. Early attempts to answer this question dissatisfied thinkers so completely, that a school known as the *Sophists* came into being, with the sceptical or doubting philosophy that man can not reach truth itself: he may know only appearances. They were essentially intellectual teachers, who tried to reduce to theoretical form the traditional and customary beliefs and knowledge. The profession of the Sophists was that of travelling teachers, especially of the art of persuasion; and in the end their tricks of reasoning caused the word *sophistry* to attain its present meaning of false reasoning. An even more doubting school, the *Sceptics*, the rationalists of their time, began to flourish. Out of this murk emerges the first great figure, Socrates.

SOCRATES

Socrates, son of the stone-worker Sophroniscus and the midwife Phaenarete, was born at Athens about 470 B.C. He received the customary education of the Athenian youth, especially in gymnastics and music; and began life as a sculptor. Six centuries after his time, a group of Graces, said to have been his work, was still to be seen on the road to the great Athenian citadel, the Acropolis. He turned from sculpture to devote his life to his own idea of education, believing that he had a god-given commission, not to teach any positive doctrines, but to awaken man's moral and intellectual nature, by clearing men's minds of ignorance enshrined and worshipped as knowledge.

He studied geometry and astronomy, and the ideas of the leading Greek thinkers. He served as a hoplite, or heavy-armed soldier, at Potidaea, where on one occasion he saved the life of the commander, Alcibiades; he served again at Delium and at Amphipolis, a military service stretching over ten years, from 432 to 422 B.C. He was noted for bravery and endurance; but he did not seek, the records say, political eminence. Yet he was a member of the senate in 406 B.C.; president of an important court; and a brave opponent of the Council of Thirty Tyrants during the breakdown of Athens in 404 B.C. He had married a woman named Xanthippe, a scold whose name still stands for shrewishness; his sons were dull and undistinguished; and one of them was rebuked by Xenophon for undutiful behavior toward his mother Xanthippe—behavior no doubt richly earned by that wasp-tongued old harridan.

In 399 B.C., Socrates was accused by Meletus the poetling, Anytus the leather-tanner, and Lycon the orator, of denying the gods and introducing new divinities; and of corrupting the young. The old man, with his grotesque, ugly face full of an odd nobility, short, thick-necked, too plump, with bulging eyes, too wide nose upturned, large mouth, and coarse lips, but one of the great thinkers of Greece, taunted his accusers, even when the verdict went against him. The accuser, Meletus, demanded the death penalty; Socrates, the defendant, could have named a lesser penalty, and so escaped. Instead, he scoffed back that his services to the state entitled him to a large pension; and took the whole matter lightly. The death penalty was imposed—death by the accused's voluntarily drinking the cup of poisonous hemlock: the Athenians used this method, in order that no citizen should have the blood of another on his hands. For thirty days, while the sacred ship sailed to Delos and returned, there was a commutation of the sentence; and when friends of Socrates bribed the jailor, and made escape possible, with a fine gesture Socrates refused life obtained through such a compromise. Plato's picture of the last days of his master is exquisitely moving. In the end, Socrates drank the cup, and reached his bodily end.

Life at home with Xanthippe had been unendurable; so Socrates had spent his days in public places, the market, the streets, the gymnasia or schools. He talked to all he met, shrewdly questioning them, and invariably besting them in the arguments. He lived in humility, scorning riches, going shoeless and shirtless, wearing one coat in summer and winter, consuming the cheapest food and drink. The charges against him were absurd: for such teachings of his as those contained in Plato's *Symposium,* in which Socrates praised homosexuality among men as the highest form of love, were not objected to by the Greeks.

To Socrates, virtue is knowledge. He held that absolute knowledge, or the truth, was unattainable; and the only knowledge obtainable, practical wisdom, of itself caused right action. He believed that no one preferred evil to good, when one understood both; hence all evil must spring from ignorance, or incomplete practical wisdom. Other virtues, such as piety, justice, courage, and temperance, were merely names which knowledge bore: piety consisting of knowing what is due to the gods; justice, of knowing what is due to men; courage, in knowing what should be feared, and what not; and temperance, in knowing how to use the good and avoid the evil.

If virtue, then, is knowledge, what is the object of this knowledge? Socrates answered, the Good: and the Good is merely the useful, the advantageous. The motive of virtuous action is pleasure, in its widest sense, to the individual. Socrates was humble about his wisdom, in spite of the oracle which declared that he was the wisest man alive; he began his philosophy with the agnostic statement, "One thing only I know, that I know nothing." Progress, as Buckle points out, begins with scepticism, with doubt. *Gnothe seauton,* Know thyself, said Socrates.

His two great problems were, how could Athenian morality be restored to its primitive vigor, and how could the tottering Athenian state be saved? Both growing out of the land's decay; the first applying as well to America today: the second. . . . To the first, Socrates refused to return to the old welter of Greek gods; he said that he believed in one god, and that virtue lay in knowledge. To the second, he said, supplemented by Plato's insistence, that pure democracy was a failure: that only the state's wisest men should lead it. A preachment of refined intellectual aristocracy, in an age of coarsened democracy. So democracy growled, and bared its teeth, and the great teacher quietly drank the hemlock, an ecstatic smile on his grotesque face.

PLATO

In 427 B.C. a son named Aristocles was born to an Athenian citizen named Ariston, a descendant of Codrus, and his wife, related to the great lawgiver Solon, the tyrant Critias, and other prominent Athenians. His name, legend says, was changed to Plato because of the breadth of his shoulders or of his forehead: he wrestled well, wrote poetry, and fought in three great battles, according to the legends. He may have visited Egypt, talking with the priests there; and Sicily, Judea, and even faroff India; he may have taken refuge, after the death of Socrates, in nearby Megara. He excelled as a soldier, and on two occasions won prizes at the Isthmian games. Then he joined the group of young men around Socrates, and his life thereafter was changed. When Socrates was given as a victim to democratic blood-lust, Plato became filled with an abiding hatred of the many, which made his life work thereafter the destruction of democracy, and the supplanting of it by an intellectual aristocracy.

He was twenty-eight when Socrates died. In 387 B.C., a tested man of forty, he returned to Athens, and began writing his famous *Dialogues,* the most charming form in which philosophy was ever bodied. The influence of the teachings of Pythagoras, and of Plato's dabbling in the Orphic mysteries in Greece, filled his philosophy with an overdose of mythology, which makes it at times difficult to comprehend; his own constant poetic nature still further muddied the clear beauty of his concepts. Yet certain of the passages are exquisitely clear. Two major passions always dominate him: a passion for improving men, and an abiding faith in the power and supremacy of mind.

The earlier dialogs are vain and playful attempts, in the form of conversations taking place among the friends and followers of Socrates and Plato, to define such qualities as courage, humility, and friendship. Only thus far does Plato get in these: that virtue is not taught, but springs up by inspiration. The great dialogs dealing with the death of Socrates crest in the *Phaedo,* in which Plato definitely stands for personal immortality after death. Death's function is to liberate the soul for clearer thinking. Slowly, as the dialogs grow, beauty takes the place of virtue as the thing the soul desires.

Then comes *The Republic,* most complete of all the dialogs. Socrates, in this, is badgered by Grecian forerunners of Nietzsche who cry that might is right, and justice merely the interest of the stronger; that morality is an invention of the feeble, to hobble the strength of the strong. Socrates—and clearly it is Plato speaking now—describes first a simple Utopia (the Greek word for "Nowhere"), which is a return to the imagined simplicity of nature. Only greed and luxury have hitherto prevented man's arriving at this state of happiness. A splendid argument follows against both aristocracy and democracy, as practiced in Greece. In the perfect state, he decides, the ruling class would be the men of knowledge, science, and philosophy; industry and militarism would merely produce and protect, but not be permitted to govern.

He then builds his ideal republic. The children would be isolated from their parents, to preserve them from the corruption of decaying adult ideas and ideals. Education, of the body by exercise, of the soul by music, of the mind by knowledge, of the spirit by a firm faith in a personal god, whether one exists or not, must be undergone by all the young. By a series of tests every ten years, singularly like an enlightened civil service examination, the whole number of growing children will be sifted smaller and smaller. The remnant will be taught philosophy, especially the Platonic doctrine of Ideas. The fact, Plato held, is mortal; the Idea, immortal. Higher education consists in a constant search for Ideas; for widening generalizations of every kind. After this theoretical education from birth to the age of thirty-five, the few picked students are to descend into the slough of the world, to match their wits against seasoned industrial tricksters for fifteen bludgeoning years more. Those who survive alone are fit to govern the ideal state.

There need be no voting: democracy means absolute equality of opportunity, not the rotation of serpent-tongued demagogs in office. The thus-selected guardians of the state will make their sole business the preserving of freedom in the state. To provide against graft in office, the guardians must live in absolute communism, owning no property; possessing no individual wives, they will enjoy instead a communism in wives, women wooed both out of the other classes, and women who have risen to the rank of guardians. There is to be no sex discrimination in this republic: and Plato wrote more than two thousand years ago! Communism of wives does not mean indiscriminate promiscuity; instead, there is to be a strict eugenic supervision of mating, with the children of guardians raised ignorant of the identity of their parents. Before the years specified for reproduction, and after this period, sexual intercourse is to be unrestricted, provided that in every case the foetus is aborted.

To the question, what is justice, Plato's answer is close to that of the extreme collectivist socialists: every man shall do what he is best fitted for, and shall receive the equivalent of what he produces. So Plato baffles the Nietzschean questioners, by answering, justice is not strength, but intelligently harmonized general strength.

Perhaps the chief continuing objection to the system is that it lacks the sense of change, of evolution, of progress, which the world is slowly absorbing as the chief object of society. Yet it intuitively implies this change: for freedom demands progress. In later dialogs, especially in the tremendous *Timaeus,* Plato builds up his concept of the beginning of the universe, and of its ultimate reality. He taught that things are merely the earthly shadows of eternal ideas; and that the ideas alone are real.

The earlier Greek philosophers had agreed with modern scientists in being materialistic monists—that is, in holding that everything in the universe, body and soul alike, was formed of some one original substance. Most Christian thought has been a dualism: a belief that mind and spirit are forever separated, neither proceeding from the other. Plato held to a third belief, an idealistic monism: that is, that all reality consisted in the idea, or the spirit; and that facts were merely illusions, shadows cast by the reality, the eternal idea, upon a curtain, the universe, which was itself a shadow. Christian Science, and some Christian thinking, agrees with him here. Thus the reality of the universe is eternal and changeless; only the shadow-facts change. Again we have a strange intuitive precursion of Ouspensky.

And so Plato died, at the hale age of eighty, to give way to a greater successor.

ARISTOTLE, THE MAN AND THE SCIENTIST

Aristotle, greatest of Greek thinkers, was a Macedonian, born at Stagira, on the Strymonic Gulf, in 384 B.C. His father, Nichomachus, traced back his descent and his medical art to Aesculapius, father of Greek medicine; this father was an intimate, and the court physician, of Amyntus II, king of Macedon, the father of Philip, and grandfather of Alexander the Great. The young Aristotle was educated in dissection, medicine, and biology; he entered philosophy by way of science—as we shall later see, the only valuable gateway to philosophic thought.

At the age of eighteen, his father being dead, Aristotle went to Athens, and spent twenty years as a disciple of Plato. Four years after Plato's death, or in 347 B.C., he became tutor of the young Alexander, who was then thirteen, for eight hectic years. In 335 B.C. Aristotle established a school of philosophy at Athens, which he conducted for twelve years. During his travels after Plato's death, he had married the sister or niece of the tyrant of Atarneus, by whom he had a daughter, Pythias. His years of married life were, by all accounts, affectionate and serene.

Aristotle's years of training with Plato were rendered difficult by reason of the fact that this was the association of two magnificent minds, one of the older generation, and one of the younger: of a magnificent speculative thinker, and a younger hard-headed thinker grounded in science. Plato once called his brilliant pupil the *Nous,* or Intelligence, of his whole Academy, the Platonic school of young philosophers; yet quarrels arose, in which the younger man drily observed that wisdom would not die with Plato; and in which the old teacher said that the youngster was a foal who had drained his mother dry, and then kicked her.

Alexander, when Aristotle reached him, was a headstrong epileptic youth, whose mad passion was to tame untamable horses. When the Macedonian king set forth upon his youthful conquest of the world, Aristotle returned to sullen subdued Athens, and set up his school of philosophy, called the Peripatetics, or Walkers, from a *peripatos* or walk, near a temple of Apollo in the suburbs. From his youth Aristotle had been a collector of books; Strabo calls him the first man in this field.

All around him Aristotle could see the Greek city-states toppling or overthrown, tyrannies and democracies alike:

from this he drew his idea that the rule of one man, preeminent above the rest, was the best of all governments. When Alexander was absent in the East, sullen Athens reacted with feeble waspishness from Macedonian rule. For a time Macedonian Aristotle fought vigorously to maintain his tremendous work, ringed by his provincial-minded enemies. At length all Athens cried aloud for the exile or death of the alien Macedonian philosopher.

And then Alexander died; and Aristotle was at once indicted, by a chief priest, Eurymedon, on the mushroom charge that he had taught that prayer and sacrifice were useless. Quietly the philosopher took the invariable option given to accused persons, of voluntary exile instead of trial; and he removed himself to Chalcis. Within the year he died; either from drinking hemlock in his utter disappointment, or by a sudden illness.

The patronage of Alexander had been invaluable to Aristotle's work, based as it was upon the natural sciences. Pliny tells us how the world-conqueror instructed his followers to furnish the philosopher with all the zoological and botanical material they could collect anywhere; it is told elsewhere that at one time he had a thousand men, through Greece and Asia, collecting specimens for him, part of which enabled him to establish the world's first zoological garden. Rich in his own name, married into a family of great wealth, and with Alexander's backing, it was not hard for Aristotle to conduct enterprises of such pith and moment. Athenaeus tells us that the king gave the scientist 800 talents (which would amount to more than $4,000,000 today) for his researches and equipment; and that Aristotle inspired the ruler's costly expedition up to the sources of the Nile, seeking to discover the cause of its annual overflow. Alexander made possible for the philosopher the digest of 158 political constitutions, to enable him to study the governments of the world. Rarely have wealthy power and science so stepped hand in hand.

As innovator in the natural sciences, Aristotle's achievements are unparallelled. Working with practically no scientific past, either of methods of scientific thinking, or of such aids to discovery as the telescope, microscope, thermometer, barometer, and the whole modern equipment of chemical and physical laboratories, he nevertheless laid an orderly foundation for all the sciences. Ancient authorities say, one that he wrote 400 volumes, another that he wrote 1,000; the fragments of what we still possess constitute a formidable library, on four major subjects: science, logic, esthetics, and philosophy broadly considered.

In physics and astronomy, Aristotle's work is marked by broad and faulty guesses, judged by our modern platform of accepted guesses or hypotheses—such as his erroneous idea that the earth is the center of the solar system. In geology, a subbranch of astronomy, his discoveries and conjectures were far sounder, such as his discovery that Egypt is merely the result of centuries of deposit by the Nile. In biology, he was even more accurate. He saw that lifeless and living matter passed insensibly into one another:

> Nature makes so gradual a transition from the inanimate to the animate kingdom, that the boundary lines which separate them are indistinct and doubtful.

A modern scientist could hardly improve upon this phrasing.

He saw that life has grown steadily in complexity and efficiency; that intelligence evolved parallel with complexity of structure and mobility of form; that life created for itself a nervous system and an organ of intelligence, the mind. In spite of this vision, Aristotle did not make the leap forward to the theory of evolution. He saw, however, the close kinship between birds and reptiles; that the primates or monkeys came midway between four-footed animals and man; and he placed man among the mammals. Moreover, he founded the science of embryology, or the study of unborn embryos or foetuses. His description of the evolution of a chicken's embryo, based on his own experiments, is so accurate that embryologists today marvel at it. In totality, no greater contribution to science was ever made by one man.

Aristotle, unaided, created the science of logic, or the science of correct thinking. He first taught how definitions should be made, with a *genus* and *differentia*—the class or genus to which the thing to be defined belongs, and the differentia or attributes which distinguish it from other objects within that class. He dealt brutally with Plato's unbased doctrine of ideas, holding indeed that universal ideas, like the idea *man,* are more enduring than individual ideas, like *that man* or *Pericles:* but that these universal ideas have no objective external existence, as Plato said, and indeed are merely mental abstractions, temporarily clothed in all the objects which go to make up the universal idea.

Aristotle's artificial doctrine of the syllogism, or logical proof by a trio of propositions:

> *Major premise.* All men are animals.
> *Minor premise.* Pericles is a man. Therefore,
> *Conclusion.* Pericles is an animal,

does not establish truth, as Aristotle thought; for the major premise always includes the conclusion. But this furnished man with a method of orderly phrasing of his thoughts; and the whole complicated subject the philosopher lifted to a surprisingly high plane.

His esthetics grows out of his psychology, which was of necessity somewhat muddied in thinking. He argues well on both sides of the question of free will against environmental determination. The soul he defines as the life principle of any organism, plant, or animal; and, being merely the life of the body, the soul cannot exist without the body. Artistic creation, he continued, comes from the craving for emotional expression, satisfied by the creation. The object of art is to hold the mirror up to nature: to imitate reality—not merely a photographic reproduction, but an expression of the essential significance. With surprising anticipation of Freud, he concludes his fine analysis of dramatic art by pointing out that its social function is to furnish an outlet for suppressed emotions in the audience.

ARISTOTLE AS PHILOSOPHER

In the cloudier fields of philosophy, he is on sound ground when he says that divine providence is no more than the operation of natural causes; yet he preserves god, not as the creator of the universe, but as the moving spirit in it: as if he were the magnet which causes, by attraction, all motion in the universe. God is pure energy; and science calls this the sole substance of the universe, without using for it the outworn name of god. Aristotle limps down from this height, to call god self-conscious, though without desire, will, purpose, or activity. In ethics, he commences frankly by stating that the object of man is not goodness, but happiness. The life of reason he finds man's highest form of happiness; it is not innocence, or simplicity, but the fullest breadth of experience in the seasoned adult. The golden mean was what he preached—a typical Hellenic doctrine flowing out of the natural serenity of the Greek landscape. Shrewd Aristotle went further, advocating with it a fair degree of wealth, which alone can make intellectual growth, man's highest pleasure, freely attainable.

Aristotle, the practical-minded teacher of Alexander, had small use for the more visionary of Plato's suggestions in *The Republic,* for all their ultimate Utopian value. One by one he criticized the pet Platonic theories; and found them unworkable, since man so far is nearer to the beast than to the god. Aristotle's philosophy was wholly aristocratic; he had only a Hamiltonian disdain for the mob. He saw woman, as did the Christian thinkers, as an unfinished man, not a completed human being; higher than love, in human mating, he ranked the health of the mating parties. He recommended strict state supervision of reproduction, including abortion whenever the birthrate grew too high. Education also he would have left in the hands of the state, with its object the enshrinement of law and order in the state, as opposed to the bloody caprices of revolution. His ideal government would have the road to office unbarred to all; but the final governors must be those who have been thoroughly tested for fitness in every way.

Like Plato, his conception of ideals suffers from the idea of a perfect stagnation toward which man should work; for the idea of constant progress had not yet fully entered the minds of men. Again like Plato, the idea of progress is implied in the broad basis of freedom that he laid. And, unlike Plato, his recommendations were those of a man more skilled in facts and their orderly marshalling, in actual science, than any man of the ancient world; he remoulded his world close to the desire of a heart buttressed by a brain trained in experiment, not feeding parasite-like on its own decaying substance.

CLASSIC PHILOSOPHY AFTER ARISTOTLE

At the death of Aristotle, Greek thought went into a long decline. The difficult scientific habit of mind had not captivated men: the Platonic method was far easier. For all that for twenty centuries Aristotle was hailed as "The Philosopher," Plato's influence, especially in the Neoplatonist or New Platonist philosophers, persisted in dominance. Thus Philo of Alexander taught that reason itself could not get at truth; that only faith could do this. With him and his greater follower, Plotinus, philosophy became theology.

As Greek civilization broke down completely, two rival philosophies gained the ascendant, over which we need not linger. These were the Stoic philosophy, founded by Zeno, with the belief that men should seek virtue; and the Epicurean, founded by Epicurus of Athens, holding that men should seek happiness. Neither of these sought knowledge.

Rome, forever the intellectual borrower, wavered between these two schools. Her sole contribution to philosophy was the magnificent philosophic poem of the Epicurean Titus Lucretius Carus, of the 1st century B.C. This poem shouted aloud, in glowing lines, the unalterable opposition between the laws of nature and the old superstitions. Lucretius preached a vast universe in evolution, dominated by the original qualities inherent in the atoms that compose matter. For all that many critics hail this as the most marvelous performance in all antique literature, the Roman world, intellectually sapped by the Christian faith, rejected it in the end, to sink back into the soothing Neoplatonic doctrine of faith. For faith, said the Christians, can move mountains; and, for all their faith, the mountains stood still for two thousand years, until science came in with its steam shovel, and at last the mountains moved down to man.

ADDITIONAL READINGS

Thinking, by Fred Casey (London, 1922), contains an excellent summary of the Greek philosophies. Plato, Aristotle, and Lucretius are available in adequate prose translations.

II. PHILOSOPHY FROM THE MIDDLE AGES THROUGH THE FRENCH REVOLUTION

FRANCIS BACON, THE MAN

For a thousand years the Christian world hibernated in its bleak faith; and then the Schoolmen appeared, imbued with Neoplatonist Christian faith, yet with minds sharpened by the Aristotelian logic. Some among these, such as Roscillinus and Peter Abelard in the 11th and 12th centuries, became in essence heretics, substituting reason for faith. The Italian Thomas Aquinas (1226–1274) and the English Duns Scotus (1274–1308) sought vainly to reconcile Aristotle and the church.

Out of the hodge-podge of Schoolmen debates and disputations, with applications of Aristotelian logic to such absurdities as, "How many angels can stand on the point of a needle at the same time?" Roger Bacon (1214–1294), an English Franciscan monk, stands out with amazing clarity. His more important philosophical and scientific writings, written in cipher, are not yet entirely translated to the world. He went beyond Aristotle, in holding that every statement must first be verified by the inductive method of observation and experiment.

On January 22, 1561, Francis Bacon was born at York House, London, the city seat of his father, Sir Nicholas Bacon, who had been Keeper of the Great Seal during the first twenty years of Elizabeth's reign. His mother was the sister-in-law of Sir William Cecil, Lord Burghley, a man of low birth who became the most abidingly powerful man in Elizabeth's England. The son, a weakling, received his early education at home; at the age of twelve, he entered Trinity College, Cambridge, for a stay of three years, which gave him a decisive contempt for what little he could learn of Aristotle's logic and philosophy, and the rest of the academic teachings; and a strong determination to turn philosophy from the pointless disputations of the Schoolmen, to the actual benefit of humanity.

At sixteen, he served with Sir Amyas Paulet, the English ambassador to France. The sudden death of his father, within three years, recalled Bacon to England, and plunged him, by the unintended omission of a legacy, into that state of debt from which he never afterwards escaped, and which contributed to the major disgrace of his life.

Even at this time, Bacon felt that philosophy was the noblest pursuit of man; yet he felt that he could not escape his training and aptitude for politics. The next year he began his long game of hammering at the gates of influential affluence, by asking Burghley, now Lord Treasurer, for some court appointment. Failure: complete at first, then the gift of the reversion or succession to an office, which did not become vacant for twenty years more. Bacon took his seat in Parliament for Taunton, and became an intimate of Essex, the queen's temporary favorite. In Parliament Bacon tactlessly opposed a plan of royal taxation; this cost him the attorney-generalship to his lifelong rival, Edward Coke.

Essex made Bacon the present of a magnificent estate, at the very moment when the noble favorite, who had incurred Elizabeth's displeasure by refusing to accept her amorous advances, had become the idol of all England, due to his brilliant Cadiz expedition. The two next expeditions of Essex failed; and out of his Irish expedition he conspired to imprison the queen, or otherwise force her to restore him to power. Bacon for some time rebuked the utter flagrancy of the lordling's ambition; now, as one of the queen's counsel, he took a prominent part in the trial of Essex for treason, which resulted in the execution of the former favorite.

The accession of James I gave Bacon new opportunities, of which he shrewdly availed himself. He became successively solicitor-general, attorney-general, lord chancellor, Baron Verulam, and at last Viscount St. Albans. He was always in debt; and his conduct of the high offices included the casual acceptance of large bribes. His watchful enemies at length secured sufficient evidence against him, and indicted him on twenty-eight serious charges. To many of these Bacon plead guilty, receiving a fine of £40,000, with imprisonment in the Tower, and permanent ostracism from office, including Parliament.

Slim defense can be made for his practices, considering their universality, and Bacon's weak plea that the bribes did not alter his preconceived decisions; but, after all, the whole episode leaves the great philosopher in a sorry light. The final five shadowed years of his life saw great literary activity; and his death at the end from a heavy cold contracted when, in his scientific zeal, he alighted in midwinter from a carriage, to stuff a chicken's body with snow, to test the antiseptic and preservative qualities of this frigid water.

His *Essays* contain many of his philosophic nuggets. Easily he passed beyond the Stoic repression of desire; since instinct in the end insists upon having its way. In morality, he preached what he practiced—the shrewd earthly sagacity of Macchiavelli's *The Prince,* that rascally conception of rulership as wily exploitation,—Bacon shrining the English government of James as the perfect type. Tactful in religion, for all his clear thinking, he professed the same religion as that of his royal masters. After suggesting shrewd ways of preventing revolutions, he builds his ideal commonwealth, with a lower caste of farm-owning yeomanry, an administrative aristocracy, and, at the peak, a philosopher-king. If he had been asked to nominate the one person suitable for this supreme ruler, Bacon would have paused idly before a mirror, and remained silent.

BACON'S NOVUM ORGANUM

Yet his whole brooding energies went toward his projected reconstruction of all philosophy. His aim was not at mere knowledge for its own sake, but for the sake of its utilization and practical application. His *The Advancement of Learning* started with the sound premise that nature cannot be commanded, except by being understood and obeyed. It sought to survey all knowledge, and set mankind to working upon the sterile deserts of man's knowledge. He praised medicine, and blamed the practicing doctors, with their invariable panacea or cure-all for all ills, namely, a physic. The task of doctors, he held, was to prolong life; but society should also permit *euthanasy,* or peaceful, voluntary death, whenever man wished it. In psychology, he invented the field of social psychology, or, better, sociology. And every phenomenon in the universe, he held, science should add to its domain. He advocated internationalism of man's intellects; and, in politics, again bodied forth his inmost dream, of a philosopher as king.

Bacon's greatest work, the *Novum Organum,* is his magnificent substitution of induction, or reasoning from facts and phenomena to generalized explanations, rather than deduction, or reasoning downward from preconceived theories to the facts. After the intellect has been cleansed and fumigated of its childish idols and superstitions, including illusions held by men in general and by each individual, as well as the social beliefs of men and the erroneous teachings of other philosophers and thinkers, he held that right thinking could take place. The sole worthy teachers are experience and experiment.

Bacon's last work, *The New Atlantis,* is his picture of his ideal commonwealth. It is based upon a matured science in control of human society. The "Solomon's House," or parliament of the Utopian New Atlantis, is free of all that had made England's government a bitterness and an agony to Bacon, and to which he contributed with such casual foulness: it is a parliament restricted to recognized scientists. The road is open to all; only the actual achievers earn the utter accolade. The task of the government is subduing and harnessing nature, rather than governing man: airships, submarines, controlling the production of new species of plants and animals, and other amazing forecasts of what science has done, are anticipated. Bacon, old and bent by the burden of his own debts and follies, calls himself no longer merely a philosopher, but a scientist; gone is his philosopher-king, and instead he, the scientist, takes his weary seat beside his fellows in factual learning and reasoning.

Bacon's contribution, the emphasis upon induction to supplant deduction, is wholly sound. Approaches toward truth come to man, in general, in three phases:

1. An intuitive perception by the poet, most sensitive of men.
2. An intuitive perception by the philosopher; and
3. An intuitive perception by the scientist, after a study of all the data and phenomena available.

The philosopher usually never hears of the poet's wild vision; the scientist almost invariably is ignorant of the poet's and the philosopher's guesses in the human dark. Neither poet nor philosopher can convince other men that his ideas are right, unless the other men happen to desire that these ideas are right. But the scientist, once he has received the intuitive flash, can marshal his facts so as to furnish what men call proof. A million men saw apples fall; poets and philosophers, from it and similar observations, wildly surmised gravitation. Only the scientist, Newton, had the intuition, and could convince other men by his reasoning, based upon facts. Many men suggested that light is curved, including the poet-philosopher Emerson, with his,

> Line in nature is not found;
> Unit and universe are round.
> In vain produced, all rays return—

yet only the scientist Einstein could receive the intuitive flash, and prove it by accumulated data, and a telescopic study of the next eclipse of the sun. Induction alone does not suffice; experiment, intuition, and experiment again, is the ordinary road; with induction the method of reasoning from the experiments. But Bacon's thinking set men on the right track.

DESCARTES AND IDEALISM

On the materialistic side, Bacon began 17th century philosophy; on the idealistic side, it began with René Descartes. This great dualist was born at La Haye, in Touraine, on March 31, 1596, of a family of the half-nobility. Educated first in a Jesuit school, then in horsemanship and fencing, the young man of seventeen betook himself to Paris, where he isolated himself to pursue his mathematical studies. He served as a soldier in the Netherlands, and then in Bavaria; he visited Italy; and at last, having so managed his affairs that he had a steady income, he settled in Holland, to devote himself to science and philosophy.

Here he changed his residence twenty-four times, and settled in thirteen different towns, all in less than twenty years—perpetually seeking, in each new environment, further knowledge of men and things. During this time he conducted an extensive correspondence with a Jesuit father, who represented him in France. His disposition caused him to scorn the erudition of the past; the spirit of science, especially of physics and physiology, was his very life. Dissection of animals, the refraction of light, were only two of his scientific interests.

His *The World*, containing the joint ideas of the infinity of the universe and the rotation of the earth around the sun, was hidden in his desk until his death. He concealed this when he learned that the church had condemned Galileo's similar work; for Descartes had no intention of antagonizing the church. His *Principia philosophiae*, appearing in 1644, dealt with accepted opinions in a way that exemplified his amusing cautiousness. He begins by saying that undoubtedly the world was created originally in all its perfection—as orthodox theology held. He continued,

> But yet it is best, if we wish to understand the nature of plants or of men, to consider how they may by degrees proceed from seeds, rather than how they were created by God in the beginning of the world; so, if we can excogitate some extremely simple and comprehensible principles, out of which, as if they were seeds, we can prove that stars, and earth and all this visible scene could have originated, although we know full well that they never did originate in such a way, we shall in that way expound their nature far better than if we merely described them as they exist at present.

Amusing circumlocution! Similarly, Descartes rejected the Copernican theory in name, but retained its essence. The earth and the planets, he said, do not actually move around the sun; they are merely carried motionless around the sun in the center of a vast vortex. Similarly Buffon, the great, cautious French naturalist, quaked away from the church's censure, professing that all species of plants and animals were created in the beginning by God; but taking pains to give in full the novel theory of evolution, with pretended answers to it so weak that the clever mind could read the truth between his frightened lines. The influence of religion upon the search for truth has not been negligible.

Descartes removed from Holland into Sweden in 1649, to receive high honors from the land's queen. Within a year he died, of inflammation of the lungs. He had never married, and enjoyed only a passing fancy for a girl of defective eyesight. Like Bacon, he was a scientist first, and philosopher afterwards; unlike Bacon, his private life did not stain his standing as a man.

He turned his attention first to algebra, which he for the first time systematized; then he invented and perfected algebraical or modern analytical geometry. He then turned the Cartesian method (or method of Descartes) to other problems—a method consisting of four factors,

1. Truth requires a clear and distinct conception of its object, excluding all doubt.
2. The objects of knowledge naturally fall into series or groups.
3. In these groups investigation must begin with a simple and indecomposable element, and pass from it to the more complex and relative elements.
4. An exhaustive and immediate grasp of the relations and interconnections of these elements is necessary for the fullest knowledge.

His study of the universe is based upon three things: the veracity of our thought when it is true to itself; the inevitable uprising of thought from its fragmentary aspects in our ordinary consciousness, to the infinite and perfect existence which God is; and the ultimate reduction of the physical universe to extension and local movement. These three are the central doctrines of logic, metaphysical philosophy, and physics, from which Locke, Leibnitz, and Newton started their inquiries.

The first psychological reality Descartes phrased in his celebrated *Je pense, donc je suis* (*Cogito, ergo sum;* I think, therefore I am). Since he, the thinker, is imperfect, he argues, there must be perfection somewhere; for, he said, the imperfect can only be conceived as being a lower degree of existent perfection. This perfect being must be God. Thus further, since the thinker is finite, there must be infinity. Except for God and man, Descartes based his universe upon strictly mechanical principles, and paved the way for a purely mechanical conception of the universe.

SPINOZA AND PHILOSOPHIC COMPROMISE

Baruch Spinoza, born at Amsterdam on November 24, 1632, of a family of Jewish immigrants from Portugal, commenced his philosophic life as a Cartesian, or follower of Descartes. To reach this point, he had to progress beyond Hebrew education in the Bible and the Talmud, and the works of the great Rabbis, like Maimonides. These shrewd defenders of Judaism raised up more questions in the quick mind of Spinoza than they settled; and he took up the study of Latin from a Dutch scholar, Franz van der Ende, in order to find out what Christians had written on the great fundamental questions. Spinoza divided his interest between Latin and Clara Maria van der Ende, his professor's daughter; returning to his Latin, when the maiden rebuffed him in favor of a wooer named Kerkering, who argued his cause with the eloquence of the gift of a valuable pearl necklace.

Spinoza was most impressed by Lucretius and the early atomists, among the classic philosophers; and by Giordano Bruno among later thinkers. Descartes won his heart wholly at first; but soon enough he began to seek for a unifying principle, to unite the isolated matter and mind of Descartes. Long before he had discovered this, he was summoned before the Hebrew elders on a charge of heresy. To preserve the brilliant youth as a member of the synagogue, he was offered a pension of 1,000 florins (about $500) if he would pretend to believe in Judaism. But the young rebel refused; and he was formally excommunicated, according to the dreadful ancient ritual.

The lonely young Jew was soon afterwards attacked by a fanatical ruffian armed with a dagger, set on ending philosopher and philosophy together by the easiest possible method. Spinoza mildly decided that retreat was in order, and went to live with friends of the Collegiant sect of Christians, later absorbed into the Mennonites. Spinoza, like all Jewish youths, had learned a trade, that of lens-grinder; and he prospered slightly at this trade. He was impassioned only in his defense of his friends; and with a stern nobility refused any official preferment which carried with it a promise not to attack established religion. His greatest work he did not dare publish during his lifetime for fear of prosecution; and, at the age of forty-five, he died of consumption.

His first book was a defense of the Bible; the philosopher claiming that, if properly interpreted as a long instance of eloquent symbolism, the Testaments contain nothing contrary to reason. Old and New Testaments were alike included in this. Spinoza held Jesus to be, not a god, but the noblest among men. There is little arresting thought so far. Nor did his second book, on the improvement of the intellect, go far.

The greatest of Spinoza's writings, *The Ethics,* is a concentrated 200 pages of difficult Latin. Spinoza reduced the permanently separated mind and matter of Descartes to one substance, God, the only substance in the universe. The will of God and the laws of nature are one and the same, with differing phrasing. Thus everything in the universe follows the mechanical laws of this deity-substance; there is no interference by an autocratic celestial emperor. The same thing can be good, bad, or indifferent at once: virtue is purely relative. God is, of course, neither male, nor female, but impersonal; the will of God is the sum of all wills, and the intellect of God the sum of all intellects. Everything is animated: and the intellect of God is diffused throughout everything.

Spinoza made happiness the goal of conduct—happiness meaning simply the presence of pleasure, and the absence of pain. But these are relative, and not absolute. Virtue, in its purest form, is the same thing as power; for Spinoza spoke with Nietzschean directness of humility as a characteristic of slave-morality. Again he becomes Socratic:

> The endeavor to understand is the first and only basis of virtue.

The human passions constitute slavery; the reason, freedom. Again, in magnificent conciliation—for he was the Henry Clay of philosophy—Spinoza stated a belief in immortality, but not an immortality of personal memory nor individual consciousness.

It is fashionable to praise this philosophy unreservedly; but there is nothing of accuracy, essential courage, or clear thinking anywhere in it. It is a philosophy of conciliation throughout: everyone is right, Jew and Christian, materialist and idealist, believer in immortality and disbeliever in it also. His major thesis, that everything is God, is simply a misuse of vocabulary. Everything is something, of course: science through experimentation says energy, while Spinoza through easy-chair thinking says God. He could have said as accurately that everything was toasted cheese or addled eggs. Science at this high point meant nothing to him; and thought based upon an ignorance or supercilious ignoring of science is precisely as valuable as no thought at all.

LEIBNITZ, LOCKE, AND THE PSYCHOLOGISTIC PHILOSOPHERS

The third important 17th century philosopher, Gottfried Wilhelm Leibnitz, was prominent as a mathematician and astronomer, and was, like Spinoza, in essence an idealistic monist—that is, he held that the real substance of the universe consisted of force, expressed in hypothetical monads, found only in souls, and placed there by God, the final cause of all. Well educated and well read, he served for forty years the family of Duke John Frederick of Brunswick-Lüneburg, making his mark in diplomacy, mathematics, natural science, philosophy, theology, history, jurisprudence, economics, and philology. His last years were passed in neglect, and were darkened by the ravages of disease. Slowly he rose in general recognition to the position of a man of almost universal attainments, and almost universal genius.

He took his departure from Descartes' division of the universe into two isolated substances, mind and matter; and Spinoza's attempt to blend these into one divine substance. The sole substance of the universe, said Leibnitz, was force. Modern science says energy, which is not greatly different: Leibnitz, the scientist, spoke in this first utterance. But this force Leibnitz conceived to be divided into units, incapable of further division; and since all matter was capable of infinite division, he said, this force could never be found in material bodies, which have parts, but in souls, which have no parts. This was the only reality. Parts of the universe other than man, he held, might have souls of a lower order than man's; only to this extent could they have reality. All was illusion except these soul-dwelling monads; they were individuals permanently separated from one another, their apparent intercommunication being merely a pre-established harmony arranged by God, the final cause of all things.

Another 17th century philosopher, John Locke (1632–1704), commenced by agreeing with Descartes that matter and mind owe their being to God, for the simple reason that something can not come from nothing, and, therefore, something there must always have been which possessed "power" and "knowledge." The second of these, knowledge, is unnecessary; Locke did not say that something could not come from energy without knowledge, and, if he had said so, he would have been wholly wrong. Moreover, if something can not come from nothing, the proper question to this philosopher is, from what did God come? Passing by this point, Locke and Leibnitz differed with regard to the reality of the phenomena causing sensory stimuli. Locke claimed that the objects that cause sensations actually exist outside of us; Leibnitz retorted, how could Locke prove this?

Bishop Berkeley (1685–1753) inclined to agree with Leibnitz, holding that objects outside the mind did not exist. When Samuel Johnson, the great author of the English dictionary, sought to disprove this by kicking a stone, Berkeley replied that the very being or existence of objects perceived lay in the fact that they had been perceived. Matter not perceived simply did not exist, he said; in other words, a flower blooming in a hidden crevass which no conscious being had ever seen, felt, or smelt, was not there at all. Pages in an unopened book do not exist, until the book is opened or the pages otherwise sensed. And so on and on. In reply to these, David Hume (1711–1776, of Edinburgh, Scotland) went much further, denying innate or inborn ideas, denying mind and Spirit, soul, external world or matter, in fact denying everything but perceptions, which nobody, he said, understood at all.

Now let us look at this chain of thinking together. Leibnitz is on firm ground when he says that the original substance of the universe is force. All the rest of his theorizing is unbased nonsense. His little unit monads, the sole reality, existing only in souls, are pure theory; his permanent separation of these units, welded into apparent intercommunication by God, is another bit of pure guesswork, unsustained by any evidence whatever. A man is entitled to his theories, whether the man be a bootblack or a philosopher. There is every reason why every man should be encouraged to emit even such a theory as that the substance of the universe is separate particles of cream cheese, churned by its spiral motion out of the Milky Way. If no evidence appears to support the theory, it is filed away and disregarded. If evidence ever appears to support it, it may be brought forth again. The whole work of Leibnitz, except his original position that the primal substance of the universe is force, may be filed away as enmummied error, as worthless and dead thinking.

It is otherwise about the speculations of Locke, Berkeley, Hume, and Leibnitz upon the realities connected with thinking, especially as to whether objects outside us have independent existence, or exist only in the form of sensations. But an important matter must be noted here: that this is all psychology, one of the sciences, the science of mind, and not philosophy at all. What do we demand of a psychologist dealing with such problems? That we study all the phenomena furnished him by his own experience, and all that he can learn of the experience of others, and from this mass of data spin any theories he chooses. He is at liberty to insist upon the absolute reality of the stone he kicks, or to say that the stone did not exist until some eye saw it or some foot kicked it. Later scientists will furnish evidence for or against either theory, until some brilliant intuitive flash comes, amply supported by scientific data, which is thereafter generally accepted; usually for a time only, to be overturned by further investigation. But all this is psychology; and we have dealt with the sciences in their proper place, and must relegate this discussion to Book II: *The Outline of Science.*

VOLTAIRE AND THE FRENCH REVOLUTION

It is pleasant to turn from speculative science, masking as philosophy, to a man rounded in every way. Born François Marie Arouet on November 21, 1694, in the farmer-trader class of Paris, he was educated by church fathers who taught him the art of verse-making, and the method of proving either side of any question: the finest possible training for a sceptic, or doubter. When the young son announced a determination to make literature his profession, his father forbade it. In the end, the son won his point. A flitting affection for a girl called Pimpette was broken off by the father. From his mother the young man had acquired the wit that let him say, when the Regent, for economy's sake, sold half of the horses in the royal stable, that it would have been more economical to dismiss half of the asses thronging the royal court. Two violent libels against the Regent, called the *Puero Regnante* and the *J'ai vu,* charging him with a desire to usurp the throne, were falsely said to be the work of the young literatteur; whereupon the Regent said banteringly, "M. Arouet, I will wager that I can show you something that you have never seen before." "What is that?" the youth inquired superciliously. "The inside of the Bastille." And so the young man entered it the next day, and was confined there eleven months.

During his stay, he adopted the pen name Voltaire, and became a poet. Soon after his release, his tragedy, *Oedipe,* was produced, and broke all Parisian stage records by running for forty-five consecutive nights. Voltaire's brilliant sallies got him into constant scrapes, ending in another confinement in the Bastille, from which he was released on condition that he would stay in England. Mastering the English language, he soon grew to marvel at the liberty of speech and comment which England permitted. The French Revolution was nurtured in England: Buffon, Brissot, Gourney, Helvétius, Lafayette, Montesquieu, Morellet, Mirabeau, Madame Roland, Rosseau, Ségur, were only a few of the scores besides Voltaire who learned the possibility of practical freedom from first-hand observation of English institutions. Voltaire's privately-circulated *Letters on the English* first began to awake the French mind to that political overturn called the French Revolution.

Permitted to return to France, after five years of peace a piratical publisher printed the offending *Letters,* causing the philosopher to flee again, this time combining safety with a love-elopement with the wife of the Marquis du Chatelet. In his retreat with her in her chateau at Cirey, Voltaire gathered together the best minds of France. This period marked the production of Voltaire's delightful sceptical romances, *Zadig, Micromégas,* and the rest. To achieve membership in the French Academy, Voltaire returned to Paris, called himself a good Catholic, flattered unmercifully the powerful Jesuits, and after one failure succeeded. His plays continued to flood forth; the love of the Marquise failed to do likewise, and Voltaire gave his blessing to the young man who had become his successor. After a glittering period as the favorite of Frederick the Great of Prussia, these two parted in a quarrel, and Voltaire settled down serenely on an old estate, to live on nearly until that political cataclysm which his scepticism had done so much to bring forth.

His tremendous historical studies were based upon a new method: an attempt to write a history of the human mind, not merely a repetition of petty facts; less the history of kings and military murderers, than the steps by which man passed from savagery to barbarism, and from barbarism to civilization. By attempting to tell the truth, the effort offended everyone, and caused the philosopher's final exile. In a burst of rage against the cheery writings of Jean Jacques Rousseau, an early apostle of back-to-Nature and the simple life, imbued with the idea that rural existence made this earth "the best of all possible worlds," Voltaire wrote, in three days, that brilliant masterpiece, *Candide,* the finest brief satirical romance in literature.

The mammoth attempt of the French Encyclopedists drafted Voltaire's prolific pen to aid an institution whose spirit can be gathered from this quotation from Baron d'Holbach, one of the group:

> If we go back to the beginning, we shall find that ignorance and fear created the gods; that fancy, enthusiasm, or deceit adorned or disfigured them; that weakness worships them; that credulity preserves them; and that custom respects and tyranny supports them, in order to make the blindness of men serve its own interests.

Denis Diderot, leader of the group, worded the aim:

> Men will never be free till the last king is strangled with the entrails of the last priest.

Into this magnificent maelstrom of destructive thought Voltaire plunged, and, no sooner was it finished than he wrote his own *Philosophic Dictionary,* covering alphabetically the whole disputed field of philosophic thought. He took as his patron saint the doubting Thomas of the New Testament, who would not believe in the resurrected Jesus until he had stuck his own fingers in the wound-holes. The end of his teaching was doubt: What could man know? The onrush of the Revolution awoke him to a disputatious seriousness, scorning a belated effort of the conservatives to buy him off with a Catholic cardinal's hat.

In his flood of brilliant pamphlets, he denied free will, miracles, the efficacy of prayer; he doubted the soul, and found it hard to believe in immortality; yet, in the end, he affirmed a vague belief in god, distinguishing what he called religion from what he called superstition. Like all the great early thinkers of the Revolutionary period, his chief assault was against God; he would have spared kings, and he distrusted revolutions through a profound distrust of the crowd. Near the end, he returned for a brief time to Paris, and died without Catholic communion, "adoring God, loving his friends, not hating his enemies, and detesting superstition."

Nothing constructive . . . a conservative clasp on God in the end, a conservative distrust of the crowd throughout . . . magnificent in destructiveness. And the temples of errors must be brought down, before untempled truth may rise in their stead.

KANT AND HIS CATEGORIES

Immanuel Kant was born in Königsberg, Prussia, in 1724, of a saddler, whose father had emigrated from Scotland. His mother, a member of the strict Pietist sect, similar to the Methodists of England, was instrumental in having the boy's early education directed toward theology. Out of a love of the classics, the young man's interest passed to an intense absorption in mathematics and physics. Poverty following his father's death caused the son to leave his native village to tutor elsewhere; in 1755 he became a private lecturer at the University of Königsberg.

For fifteen years he was unable to rise in scholastic circles, for all his excellent abilities as a teacher. His request to be made a professor was twice refused; and he refused as firmly to accept an appointment elsewhere. In 1770 this ambition of his life was fulfilled; and the quiet little professor continued with his thinking and lecturing, the last person in the world that any one would pick out to amaze the world with his philosophy. In his shy philosophical way he could not quite make up his mind to become married. Not until he was fifty-seven did he publish his first epochal work.

His earlier writings, on science, are important as showing that, at least, he had the proper basis for philosophy. He wrote treatises on problems of force in physics; on such geological matters as earthquakes and winds; upon the different races of men; and a group upon astronomy, ranging from a study of the volcanoes on the moon to the splendid *Theory of the Heavens,* in which with great mental audacity he expanded the Newtonian generalization of the nebulous origin of the solar system to include the whole starry universe, laying the foundations upon which Herschel and Laplace subsequently erected the nebular hypothesis. With the training and mind of a scientist, he should have been able to apply science to the problems of philosophy. To some extent he succeeded, in the three great Critiques which are the peaks of his philosophical system.

The Critique of Pure Reason is a critical analysis of man's reasoning power. Kant begins by denying the teachings of the English school, that all knowledge is derived from the senses. Assuming that man has certain knowledge independent of sense-experience, he asks, "My question is, what can we hope to achieve with reason, when all the materials and assistance of experience are taken away." General truths, he holds, are independent of experience—clear and certain in themselves. He instances mathematics as an example of knowledge independent of sense-experience.

With great clarity he worked out accepted principles of modern psychology for the first time, by which the sensation becomes the percept, and the percept the concept. With brilliant correctiveness Kant isolated space and time as categories—not things perceived, but methods of perception, mental ways of making sense out of the sensations. The universe he divided into:

1. Phenomena, which come to us by the senses; and
2. Things-in-themselves, which can never be grasped by the mind.

Science, he says, is naive, in imagining it is dealing with realities, wheras it is rather dealing with phenomena. Philosophy, he says, is wiser, knowing it is dealing only with sensations, percepts, and concepts. If he had said psychology instead of philosophy, there could be no quarrel with this.

The Critique of Practical Reason turns to religion. Kant finds this based, not on science or theology, but on morality: the word of the conscience, which Kant calls the *categorical imperative,* is absolute, and comes prior to all sensations, percepts, and concepts. Hence happiness may be ignored; duty performed is the one goal of man. This, says Kant, proves the freedom of the will. Moreover, man feels, though he can not prove, the truth of immortality; and this postulate of immortality justifies man's feeling that there is a god.

The Critique of Judgment, dealing with beauty and adaptation, is less important than two other studies, the first of them on religion and reason, perhaps the boldest of all Kant's speculations. Since religion must be based on morality instead of experience, sacred writings must be judged solely by their result in contributing to moral progress. Ecclesiasticism or churchification of religion has corrupted it grossly; neither prayer nor miracles can avail to establish a religion. The lowest state is where a reactionary government uses the church to harass further the populace—as in Prussia. Lastly, Kant's study of politics viewed all history as the realization of nature's hidden plan to develop a perfect political constitution. Kant's essay on *Eternal Peace* severely indicted greed as the chief political agent of unhappiness in Europe.

Subsequent opinion has dealt gently with this mammoth structure of reasoning. The preliminary psychology concerning sensations, percepts and concepts has become generally accepted. Modern science repudiates wholly the idea that there is any certain knowledge independent of sense-experience. Mathematics, for instance, which Kant erected as the cornerstone of his system of independent and ultimate knowledge, is known today to be as relative as sociology. In answer to his question, What can we hope to achieve with reason, when all the material and assistance of experience are taken away? modern man answers simply, Nothing. The conception of time and space as categories paved the way for

Einstein and Ouspensky, who maintain that time and space are mere static dimensions, residing in the mind.

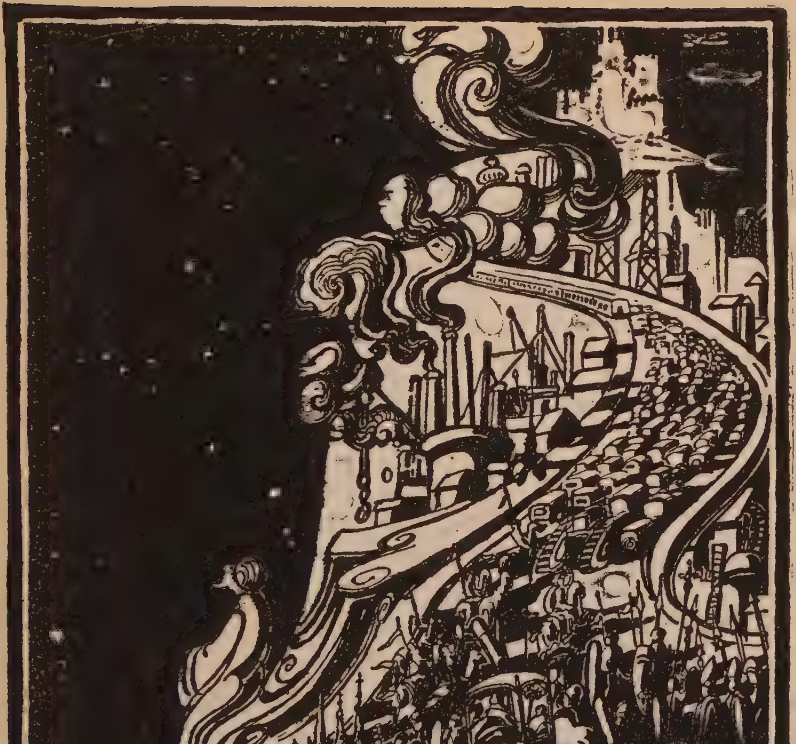
Subsequent opinion has dealt more harshly with Kant's vast cerebrations about religion and god. The categorical imperative, conscience, or moral sense, is not inborn and independent of sense-experience: it is the product of observation and the teachings of others, and, in practice, too frequently cripples sane living. If for "moral progress" we substitute "social progress," in judging religions, we are on firm ground; but this would be to substitute sense for Kant. A splendid scientific start, and then the mind galloping away into the swamp of absolute knowledge attainable without any sense-experience, and a conscience immutable and eternal.

Johann Gotlieb Fichte (1762–1814) eliminated the unknowable thing-in-itself, and divided what he saw as the one thing in the universe, the mind, into two, the thinking mind and the object it thinks about. The totality of the universe Fichte conceived as one vast universal mind. Friedrich Wilhelm Joseph von Schelling (1775–1854) differed from Fichte in imagining an intangible something underlying both mind and matter, recognizable only by intuition—a weird sort of God lying outside both matter and mind, though permeating both.

HEGEL AND THE HEGELIANS

Georg Wilhelm Friedrich Hegel was born at Stuttgart on August 27, 1770. His father was a subordinate official in the department of finances at Württemberg; of his mother, we know only that she taught her son the foundations of Latin. Educated at the grammar school of Stuttgart, the youth showed his systematic mind in elaborate diaries, digests of books studied, and extracts from various sources dealing with philosophical and mathematical subjects. He entered the university of Tübingen as a student of theology; but soon turned to the classics, receiving a diploma stating that he was especially deficient in philosophy.

His appearance gained for him the nickname "Old Man," but he indulged freely in the walks, beer-drinking, and love-


Louis Bromberg

He sits, and dreams. . . . Humanity
Climbs its eternal Calvary:
Behind his back the roars, the screams,
The long silence. . . . He sits, and dreams.

making of his fellows. The death of his father gave him a legacy amounting to less than $2,000; and Hegel wrote his schoolmate Schelling for advice as to where to settle, wherever there would be simple food, plenty of books, and a lot of good beer. Schelling's recommendation was Jena; Hegel accepted this, since Schiller was teaching history here, Schelling expounding romantic philosophy, and here other leaders of young German thought were thronging. During the seventeen years at Jena, and the ten-year period that followed at Bamberg, Nurnberg, and Heidelberg, Hegel completed his system, insofar as it was ever completed.

This was Europe's period of storm and stress. To the stormy music of the French Revolution, and the long, resistless progress of its terrific successor and synthesizer, Napoleon, the "Absolute on Horseback," as Hegel called him, the great Hegelian system came into being. This era of violent upheaval made evolution the most impressive and oppressive fact of the day; it drove the thinker into formulating some explanation of such an intense series of changes. When Europe settled toward peace, Hegel continued unperturbed his mental labors; and, after one day's illness of cholera, he died in 1831.

The philosophy of Hegel stems out of the threefold law which Fichte announced, of thesis, antithesis, and, finally synthesis. This threefold method became, in Hegel's hands, the Hegelian dialectic, carried out with characteristic German thoroughness at times to the point of absurd obstinacy. The three stages found in all evolution, Hegel stated, were,

1. Original unity: the thing in itself.
2. Divergence of opposites: the thing pushes out of itself, and we have it externalized, yet for itself, or to secure the third stage,
3. Reconciliation of these opposites: a synthesis, in which the the out-ness is cancelled, the externalization reabsorbed into the thing, and, accordingly, the thing in and for itself.

In working out this elaborate system of triads, or threefold developments, Hegel bored his way into the Absolute of the universe through the threefold way of a history of philosophy; a history of the development of the successive forms of consciousness; and in the *Logic,* in which the universe or self-knowing Absolute Ego is caught thinking its Absolute thoughts. As Hegel says, this last is:

> the representation of God himself as He is in His Eternal Essence, before the creation of nature and of finite mind.

The true reality, Hegel taught, is reason; the universe is merely the development of thought. Therefore the real is rational, and nature and spirit are one in essence. Nature is merely a transient stage in the development of the Absolute, which is a progress, not a stagnation. Carried into human affairs, struggle is the law of growth; real maturity grows only out of compulsions, responsibilities, and sufferings. Life's goal is not happiness, but achievement.

At its best, the threefold development of Hegel is merely a description of change and adds little to our understanding of change itself. It is, of course, in sharp contrast to the philosophy of Ouspensky, based upon Einstein and more recent scientific discoveries. In Hegel's hands, the system of triads becomes ponderously artificial, with phenomena forced arbitrarily into a Procrustean triple bed. It seems slightly pathetic to find a mature man seeking to think out the infinite thoughts of God the Absolute: when modern science has dispensed with all idea of god. Instead of reason being the true reality, reason is, as we have discovered in our study of psychology, a late development in the universe. The vast Tower of Babel of Hegel's system is, like its early architectural prototype, a thing of confusion of tongues: it is no wonder that his followers, soon after his death, scattered irremediably into diverse camps, not since to be united. As an obelisk of baseless thinking, it appalls with its size: as a contribution to man's thought, it weighs no more than its weightless base.

Off to the right marched the conservative Hegelians, claiming that the master's teachings justified and required absolute obedience to the absolute Prussian state. Off to the left strode Feuerbach, Karl Marx, Frederick Engels, and the tanner Joseph Dietzgen, all of whom accepted the artificial Hegelian triads, of thesis, antithesis, and synthesis, but placed the first step, not in some Platonic-Hegelian idea existing in its perfect entirety from eternity, but in the undifferentiated matter in the universe: the three steps being,

1. The matter of the universe,
2. Evolving its antithesis, as in the case of the higher animals, in consciousness; and
3. Returning at the death of the animal, plant, and solar system, to original matter, in some condition lifted spiralling upward by its evolution.

The human mind, that battleground of so many swivel-chair philosophers, was reduced by Dietzgen to its proper place, as a part of nature, a phenomenon differing in no essential wise from other phenomena. Philosophy thus becomes reduced to the science of the human mind, or psychology. Lester Ward, the American, established this by scientific or inductive reasoning—reasoning from the data upward to the generalization; he located the very origin of mind, as we have seen, as a by-product of sexual selection. He and Dietzgen, approaching the problem from two vastly differing directions, arrive at the same conclusion: and modern science so far accepts their conclusion.

The dominant thinking, the religions, the philosophies, the arts of any century are conditioned, not by eternal inborn ideas, but by the external economic environment, the methods of production and distribution, insist these Hegelian left-wingers. This is the celebrated materialistic conception of history, as formulated so clearly by Marx and Engels. Too simple, too easy, to cover everything: but what a clearing away of mental rubbish it involves! All this, added to the deeper researches of Freud and his followers into the hinterland of the consciousness, control our present understanding of man's mind, the indistinguishable Siamese twin of his soul; and the two of them born of man's body.

ADDITIONAL READINGS

Thinking, by Fred Casey, already referred to, briefly and sharply summarizes the philosophies treated here.

The writings of Voltaire, Kant, Hegel, Marx and Engels, and the others mentioned, are easily available.

SCHOPENHAUER AND PESSIMISM

So the vast outburst of brilliant scepticism and tortured popular will called the French Revolution came to its bloody end; its shrewd greedy little tyrant decayed to death, celled on a lonely rock in lonelier seas; and the royal vultures of Europe tore more foully than ever at the dead bodies and dead livelihoods of Western civilized man. Life was wreckage and failure: and one of the most tortured souls in Europe arose out of his agony to say so.

Arthur Schopenhauer was born at Danzig on February 22, 1788, son of a merchant who had inherited from his mother the germs of mental malady. The father married, at forty, a wife twenty years younger than himself; differences of age and temperament poisoned the union wholly. The wife was a novelist of some reputation, whose theme, based upon her own self-surrender and inertia-engendered inability to free herself, was the pitiful weak one of renunciation: not the magnificent renunciation of the free soul, but the sterile renunciation of the shellfish or the rooted plant. The two children of this union, Arthur and his sister Adele, were harassed through life by excess of sexual desire and excessive capacity for suffering. When the son was seventeen, the father, who had shown symptoms of insanity, fell or threw himself into a canal, and was drowned. The still young widow proceeded to Weimar—this was in 1806—and entered upon a belated life of free love. Son and mother quarrelled repeatedly, jealousy of each other being one motif. In anger, she once pushed the young man down the stairs; he retaliated by saying that she would be known to posterity only through him.

The young man had his fling at the sorry pleasures of the broken world, which added to his inborn and environmental tendency toward gloomy cynicism and suspicion. Dreadful fears and fancies hovered constantly about him. He kept his pipes and private treasures always locked up, and did not dare trust his neck to the razor of a barber; he slept with loaded pistols, in constant fear of burglars; and walked about in trembling terror of assassination. Without mother, wife, child, family, friend, or country, he made himself an isolated exile from humanity. His masterpiece, *The World as Will and Idea,* appeared first in 1818; the rest of his life was spent in revising this neglected child of his brain. For it was neglected: men were too poor and tired to turn to a book exaggerating their poverty and prostration. He quoted, about this book, Lichtenberger's magnificent epigram which applied to looking into all books and works of art:

> Books . . . are as a mirror; if an ass looks in, you can not expect an angel to look out.

As teacher and philosopher, he largely failed; and a hatred of Hegel's influence, and an obsession that this influence prevented the acceptance of the sick young pessimist, grew almost to an insanity with him. At the age of seventy-two, he died of a heart attack.

His book began in the influence of Plato and Kant: "The world is my idea." Modern science says that the I is the mirror for the world, blessed—or cursed, if you prefer—with a knowledge that it is mirroring the world. Schopenhauer was much nearer accuracy when he saw the essence of mind not in thought and consciousness, but in will—an insistent conscious and unconscious striving. He worded it,

> Consciousness is the mere surface of our minds, of which, as of the earth, we do not know the inside, but only the crust.

This is a fine philosophic intuition of psychoanalysis. The will is

> the strong blind man who carries on his shoulders the lame man who can see.

Even the body is a product of the will: of countless preceding accumulated wills blindly pushing toward ever higher organization of organic or living matter. Intellect decreases, as we go down the ladder of life; will holds its own. Will defeats even death, by nature's strategy and the animals' martyrdom, called reproduction. Again anticipating modern thought,

> The relation of the sexes . . . is really the invisible central point of all action and conduct. . . . It is the cause of war and the end of peace . . . the true and hereditary lord of the world.

Superficially all correct; only the later delving into the origin of this sexual will, as supplemented by the explanation given in our study of psychology of the reproductive and sexual wills as part of the return instinct or compulsion, can go deeper; and show that even the sexual will is an insistence to return to a prior state of union, on the path back to the earlier stage of lifelessness or death.

Now Schopenhauer's disease begins to speak for him. If the world is will, he says, it must be a world of suffering. The picture of life as it is is too dreadful for contemplation; continuing to live depends on our not knowing life too clearly. Religion comes as man's effort to escape from death; insanity, to escape from the abysm of human pain. Genius is knowledge that has risen superior to will, he says: women are forever barred from it, because they must remain forever subjective—the dictum of the bitter misogynic or woman-hating philosopher. Genius he misdefines as the greatest objectivity of the mind: overlooking that this would establish the lowest forms of life, far below man, as the highest geniuses. Man today does not hold the oyster more of a genius than Shakespeare.

In geniuses, who are in essence semi-madmen, are man's real aristocrats—Schopenhauer momentarily forgetting that as many, or more, women, are insane, than men. Art's function he mis-sees as an effort to free knowledge from will: instead of seeing in art the supremest expression of the will in symbols universally perceptible, permitting vicarious satisfaction of the will, or a release from the will by what Freud calls sublimation—a substitution of some symbol for the actual thing desired. His religion tends toward Buddhism, whose essence is the destruction of the will. The ultimate wisdom, Schopenhauer said, is Nirvana: reducing one's will to the smallest amount of will and desire. Fighting against this desire for death is man's desire for woman; let us, then, avoid woman utterly. So Jesus and Buddha taught: so the modern pessimist taught.

This philosophy is its own criticism. On the one hand, the extreme sensitivity of Schopenhauer made him see correctly the importance of will as the basic element underlying consciousness; on the other hand, his half-mad ancestry, his torturing family life, his half-insane fancies, his self-imposed isolation, his mother-love poisoned into mother-hate, drove him from his clear vision of the vastness of the sex urge to a half-mad repudiation of it. Only the tortured brainsick see the world as a world of suffering; hunger finds food, love finds its mates, intellectual hunger builds generalizations: pain breeds pleasure, and the last and greatest pleasure is death.

THE POSITIVISM OF AUGUSTE COMTE

Philosophy is at best a parasite, feeding upon the body of accumulated science. Darwin thrilled the world with his suggested explanation of the how of evolution, the survival of the fittest, or the elimination of the unfit. Herbert Spencer elevated this, by broad generalizations, to cover all thought. He had been preceded by the French Auguste Comte—a harassed soul whose domestic unhappiness resulted in a mental breakdown, and attempted suicide. After this he recovered, to build his mammoth *Positive Philosophy* and *Positive Polity,* with fine authority making a start toward the organization of the sciences into a logical hierarchy—the basis of the organization used in Book II: *The Outline of Science.* He uttered the famous three-fold division of man's mental progress,

1. The theological stage, when facts are explained superstitiously by the hypothesis of some god or spiritual being.

2. The metaphysical stage upon deductive philosophic reasoning; and
3. The positive or scientific stage, when precise observation, hypothesis, and experiment rule.

His life tapered off into an attempt to furnish Europe with an elaborate godless religion, enshrining Man. The dog returns to his vomit; the sceptic, when his mind weakens with old age, too frequently returns to his superstition.

SPENCER AND INDIVIDUALISM

Herbert Spencer was born April 27, 1820, of a sceptical schoolmaster father. Largely self-taught, at seventeen he worked as an engineer on the London and Birmingham Railway, and eleven years later as a sub-editor of *The Economist.* His mind was lazy, and his scientific work dishevelled in the extreme. His secretary says that he never fully read any book on science; his casual experiments were left half-finished; he attempted to read Kant, and threw the book away, deciding that the German was a dunce. What facts he had he picked up, with an insatiable curiosity. It was this man who set out to survey all knowledge in the light of evolution, and show the orderly progression from the atom to the most complex activities of society.

In 1860 he published his program for a Synthetic Philosophy, and for the next thirty-nine years he forced his weak and ever-reluctant body to carry out the tremendous program there laid down. The first volume, *First Principles,* is Spinoza-like in its effort to reconcile science and religion. This Spencer does by the clever expedient of confining science to the Knowable, and religion to the permanently Unknowable. This in effect crowded religion off the table; but Spencer could not see this, and always regarded himself as a dualist.

Spencer pointed out that all knowledge is relative: all that we discern is that one thing is like another, or different from it. The perception of the relations between things constitutes knowledge. Thus the absolute, in science or religion, cannot be known. Science is partly unified knowledge; philosophy, to him, completely unified knowledge. The indestructibility of matter and motion being stated, Spencer comes to the double law underlying the universe: evolution and dissolution. By the first of these, matter passes from an indefinite one-substanced or homogeneous state to a definite many-substanced or heterogeneous state. Specialization flows out of similarity. All tends toward a final equilibrium, or omnipresent death. Then follows dissolution, a resolution into the simple one original substance again, and a rhythmic period of evolution following. The universe is an endless repetition of these great cycles of evolution and dissolution.

With much penetration Spencer applied this to the sciences. He located the origin of religion in ancestor worship. In ethics, out of an extollation of free will and its consequent social inequalities, he vigorously opposed socialism, communism, and all collective actions by the state or otherwise, beyond mere protection of the individual in his struggles. He made his government, his laws, a mere set of boxing ring regulations to govern the combat within, instead of making them constructive principles of social life. This merely crystallized the dominant desire of young capitalism in England: the philosophy grew out of the social organization.

To the bitter end Spencer carried out this individualism, in practical and political life opposing all attempts to ameliorate the condition of the laborers and the needy, all child labor laws, minimum wage and maximum hour acts, and the like. This was the first application of Darwinism to philosophy: a simple biological philosophy, magnifying the struggles characteristics of life, especially of low life, to let it control all subsequent life. But man differs from lower life in his ability to control and tame, by joint effort, the world around him. It was this that Spencer failed to see.

NIETZSCHE EVOLVES THE SUPERMAN

Even more extreme in his following of early Darwinism was Friedrich Wilhelm Nietzsche. This poet-philosopher was born at Rocken, in Prussia, near Leipzig, on October 15, 1844, of a father who was a minister, descended from a long line of clergymen. Excessive feminine coddling and petting, after the early death of his father, made the son an obnoxious example of what normal boys call a "sissy."

At eighteen, he lost his faith in God; and he searched until he had built himself a new god, in the Superman. All his life he was tortured by a lack of religion; even his submergence into the wining and woman-chasing life of his college mates failed to satisfy him, and drove him instead into a hatred of what he called the "beer-dipped culture" of his countrymen. A few years as a conscripted soldier, ended by an injury, and he became distinguished as philologist and philosopher. Wagner, the great innovator of modern operatic music, became one of his early passions. The popularity of Wagner eventually awoke some serpent of envy which made Nietzsche madly critical of what he had once passionately adored. The master's *Parsifal,* enshrining Christian pity and spiritual love, made the separation final.

Out of a rhapsodic attempt at psychology in *Human All Too Human,* Nietzsche's weakened body neared death; convalescence was marked by a love affair which failed, and which turned the half-mad poet into a woman-hater as bitter as Schopenhauer had been. He took to isolation, like his predecessor; and out of this loneliness he built his new god, the Nietzschean Superman. He sharply distinguished between the two moralities of Germany and the rest of Europe, the master-morality and the herd- or slave-morality. The one came from aristocratic Rome; the other, from the slavish East, from the Jew, the Christian, the democratic mood: so he grouped them. Life is motivated by the passion for power; reason and morality are nothing in the whirlwind gusts of the desire for triumph. Strong men simply announce, "I will;" only weaklings, Christians, and Buddhists seek for reasons.

The sadist, or enjoyer of suffering, in Nietzsche, took delight in the evil and cruelty in the world. The goal of life is not mankind, but the Superman, beyond all good and evil. Only weakness is evil. Only aristocracy could produce such Supermen: democracy, which he defined as "the mania for counting noses," must be rooted out of the earth, before the race fails. Democracy means a mere drifting; and the elevation of women, or feminism, is a mere extension of democracy and Christianity. So he reasoned. The ideal society would be divided into producers, including farmers and business men; officials, including soldiers; and rulers. How strangely this echoes Francis Bacon, disappointed seeker for supreme power!

And then this man, who built out of his feeble body and mad craving for power a vision of the Superman, holding locked within himself the belief that only he could fill the role, became insane, continued so for twelve years, and died so.

Poet, yes; out of his own lack he erected his diseased picture of himself as the Superman. Philosopher, yes, if we properly vision philosophy as deductive thinking, based on the thinker's own desires and hatreds. As Gloria Goddard words it,

> All philosophy is founded on the desires and antipathies of its propounders.

Much of his own criticism of Christianity and its slave-morality is sound; but man's aim, man's goal, is no sadistic blond brute. Only democracy can permit the emergence of man's fullest quota of genius, and can liberate even a Nietzsche from the fetters of his bodily and mental environment. Nietzsche's hatred of women is a mere picture of his own mental and emotional littleness; his Superman is little more than a toy made in Germany, although in practice the toy might act like a charge of TNT. Hatred and half-insanity may be sensitive toward undiscovered truth, but can not step serenely forward into the sunlight of tomorrow.

BERGSON AND CROCE: INTUITION AND LOGIC

Henri Bergson, born at Paris in 1859, is the leading idealist today. The word *idealist* is used, of course, in its strict philosophic sense. To him, truth is the universe. It consists of that general consciousness or intuition, from which the bee's instinct and man's intelligence have evolved. Its essence is the eternally changing moment, *now,* an absolute time duration which we apprehend only in intuitions. Life in reality is a movement of pure time; matter is an illusion produced by part of the total movement taking place in an opposite direction from the rest. Material objects are merely obstacles that the intersecting time-currents produce, at the point where the now is becoming the future.

This is strangely akin to the physical theory that matter is the impact between the positive proton and the negative electron, or the balancing tie between them. When as a whole we act intuitively, we act freely; this is a creative act, and such acts constitute the evolutionary process. Creative evolution then is the free surging onward of some part of universal life. To Bergson, both mind and matter are parts of the life process. This persistent life force is what we mean by God: God and life are one. This is not an infinite god, but a finite one: he is merely unceasing life, freedom, action.

Such a vigorous exaggeration of the importance of intuition was needed, to reestablish in its true position this pre-intellectual process. Yet, in its entirety, the philosophy is one-sided, ignoring the large part that the intellect plays. In its identification of life with god, it is merely another Spinoza-like attempt to reconcile irreconcilables.

The Italian critic and philosopher, Benedetto Croce, has not had the wide acceptance that Bergson received; for modern men and women, their faith in the old religions diluted by growing knowledge, instinctively welcome any obscure idealism, like Bergson's mysticism, which relieves them from clear thinking. Croce stems rather out of Hegel, holding with the German obscurantist that the only reality is the idea, and that all philosophy may be reduced to logic. Most widely accepted as a critic in the field of esthetics, his definition that beauty is expression is, after all, a somewhat meaningless juggling with words.

RUSSELL, JAMES, AND DEWEY

The English Bertrand Russell is distinguished as a mathematician, and has some repute as a philosopher. His mind turned from active life to a worship of cold mathematical concepts; he has called modern progress in understanding the mathematical infinite the greatest achievement of modern man. In mathematics he finds eternal truth and absolute knowledge, as did Kant; his ambition was to reduce philosophy to a similar eternal mathematical absoluteness. The World War of 1914 shocked the academic mathematico-philosopher into becoming a violent pacifist and an insistent communist. Neither position essentially indicates a real grasp of the facts of the universe.

We must pass over the tepid American temporizer, George Santayana, an insignificant mental prestidigitator, for William James, the utterer of a philosophy, Pragmatism, that is distinctively American, with all that the term implies of praise and blame. The truth of an idea, James announced, depended on how the idea worked; or, to use his own phrase taken from American industrial life, upon the "cash value" of the idea. The true thus becomes the expedient in thinking; just as the right is the expedient in behavior. Truth is the mere process of verification which happens to an idea after it is formed. The test of an idea's truth is its consequences.

Men are divided into two classes: the tender-minded, who tend to be religious; and the tough-minded, who tend toward atheism. These two classes of men James, another Henry Clay in philosophy, seeks to reconcile by supposing a finite god,

> One helper, one among his equals, in the midst of all the shapers of the great world's fate.

The persistence of a belief in God is the best proof of the life and moral value of the idea. . . . All typically American: the idea of God judged by its cash value: as profound as an elementary cross-word puzzle, as accurate as a modern tabloid newspaper. Whatever one believes, as long as it works, is true. The ancient Hebrews had no other way of testing the claims of rival prophets, the back-to-Yahweh of the great insurgents, the forward-to-Baal of the accepted royal preachers. The ancient Hebrews admittedly were not grounded in scientific thinking: the attitude of William James is parallel.

John Dewey is primarily a great and liberal educator. He sees with clarity that mind has evolved as surely as has the body, from lower forms of animal existence. Divinity lies, not in vast powers of the universe, but within men. Reasoning, he sees with brilliant correctness, begins, not in premises, but in difficulties: thinking must always face the facts, and weave its way out of them. Ignorance is unconsciousness, and spells slavery. Only intelligence can aid man to share in the arrangement of his own fate. Democracy must be accepted, for only out of democracy can every individual have his opportunity to become his potential greatest. Rather than a rigid state, he favors the widest encouragement to all natural social, intellectual, and industrial groups and organizations, forming an international network of influences: this, and all problems, must be met with a mind open to scientific experimentation at all times. This is far sounder than most thinking.

OUSPENSKY; TIME AS A STATIC SPACE DIMENSION

The *Tertium Organum* of the Russian mystic philosopher, P. D. Ouspensky, takes its starting point directly from Einstein's isolation of the time-space relationship, the Einsteinean *interval*. Time is merely a special dimension, says Ouspensky, in no wise differing from the other three dimensions of ordinary space. Hence time is static, motionless; there is, in fact, no change, no evolution; these are only phenomena created by the human consciousness. Objects, rightly seen, are always four-dimensional extensions in four-dimensional space, motionless, uninterrupted and unbroken, existing unchanged forever, with no beginning and no ending.

This sounds absurd, on first glance. A tree, a cat, a man, a family, a state, in reality motionless four-dimensional continuums? Yet the tree today, you would say, is the same tree as the tree of six months ago, although today it is covered with green leaves, and then its branches were winter bare; and it is the same tree, for all its apparent changes, that was here one, two, five, ten, twenty years ago—back to the time it emerged from its acorn or seed. The whole object, *that tree,* may then be seen as a long extension down the fourth dimension, time: beginning with the tree's beginning, growing through sapling stage to maturity, continuing until its end as lumber, or by natural decay. "Beginning" in this use merely defines one end of its apparent surface. So all other single objects may be truly seen as such extensions, or continuums, down the fourth dimension, time. Everything is connected: we arbitrarily say that the object tree begins its surface boundary at the point where its seed sprouts or germinates; and yet this is merely the point at which it is connected or severed from its parent tree.

Thus we can build back to the vision of the many-branched class-object *oak tree,* containing all the oak trees that are and were, all united to one another in the fourth dimension; and so, building more widely, to the class object *tree,* the wider class object *all plants,* the wider class object *all life,* and so back to the wholly connected class object *the universe*—infinitely branched and tangled in its apparent development, but in reality one vast motionless intertwined continuum in the four dimensions of space-time. What are called past, present, and future came into existence at the same time: the future exists as fully, even as you read this page, as the present around you, or as the past that this book surveys.

Why, then, do we perceive, not even the past—for we say that that has already gone; nor the future, which we say has not yet come; but, as reality, only the present just after it has altered to the immediate past—after the expiration of the time necessary for any sensory perception of the present to travel from the senses to the brain? How do we see the spacial dimension, time, as a flowing, manifesting itself in apparent motion and change?

Consider again the four-dimensional continuum that is you: a long extension ranging from the moment of your conception within your mother, through birth, childhood, adolescence, maturity, and reaching onward to your death. This four-dimensional being, you, has existed (without that attribute called consciousness) along with the most ancient past and the most distant future. Suppose, as a clarifying symbol, that a wire runs along the top of this four-dimensional body, where what is called the brain exists. Suppose that a spark begins to pass along this wire, starting at the end called birth, illuminating as it goes its intertwined tangled environment of other four-dimensional bodies, and even illuminating itself: now flickering brightly, now dully, as in times of sleep; passing but once, with brief backward illuminations called memory, and brief forward illuminations called foresight or foreknowledge. Once, and once only, this spark passes along the wire: and then, at its end, consciousness ends. And this is what is called life. The apparent movement of the spark, consciousness, rightly seen, would probably be merely our misconception of an extension in some higher dimension.

Ouspensky's brilliant book is marred by unbelievable lapses into Oriental mysticism and flashes of self-contradiction, usual in tempestuous emotional Russian thinking. It is a step toward the inevitable philosophy growing out of Einstein's monumental discoveries.

PHILOSOPHY AS A SUBJECTIVE PRODUCT

With this modern note, we end our survey of Philosophy. Most philosophers insist that philosophy, at least, is objective. Schopenhauer denies genius to women:

> Women may have great talent, but no genius, for they always remain subjective.

The alleged objectivity of philosophic genius speedily dissolves upon examination.

Philosophy, like all thinking, is rooted in the mind's appetite to master facts, and to pander generalizations among the conquered facts. But the achiever among men does not philosophize; he is too busied and bewildered by the multiplicity of facts, living and dead, whose natures he must control. It is the failure who philosophizes, the man from whose hands the reins of practical affairs slips, or who abandons them, due to some dissatisfaction over the extent of value of his control.

Philosophy is always thinking muddied by futility; its essence is an attempt to widen the limited scope of personal experience into the limitless range of a generality. It is a man's personal reaction to the universe: the distillation of experience, filtered into one's consciousness through the limited ego. There must be as many philosophies as there are introspective men. The study of the philosophies of others has its sole worth in indicating a way to achieve one's own. He who assumes the unaltered philosophy of another, says Gloria Goddard,

> is as ludicrous as he who dons his neighbor's hat, and infinitely more pathetic.

All deductive thinking is subjective; and philosophy, as a whole, is deductive throughout, where science is usually inductive. Socrates was unhappy with his wife, and held himself the wisest man alive: his philosophy extolled homosexuality among men, and set wisdom as the highest virtue. Plato, descended from Athenian rulers, and himself failing to achieve Athenian leadership in action, evolved an ideal state in which the philosopher class, including himself, should rule. Aristotle, pampered protege of his pupil Alexander, saw Alexander's government as the best possible, and advocated that aristocratic leisure and wealth which he enjoyed so easily.

Francis Bacon, barred by his irritating precocity, pride, and his official chicanery, from political leadership in England, built first an ideal world in which the philosopher—himself—would be king; and, when his patron James turned from him, saw instead the scientist as ruler—himself again, with a new name. Descartes, feeling his own inactive unparticipating imperfection, built up a philosophy of perfection as god. Spinoza, cast out by Jew and largely by Christian also, sought to reconcile all, that he might lead all; making understanding, which he possessed, the basis of virtue. Voltaire, taught Jesuitically that both sides of a question could be defended with equal facility, became a sceptic, doubting both sides. Kant, denied in experience professional advancement, based his system upon inborn thought and morality rising outside sense experience altogether. Hegel, a rational straw in the whirlwind of the Napoleonic storm and stress, plinthed reason at the top of his mammoth tower of triads. Schopenhauer, half-mad sensitive embittered by the broken world about him, harassed by excessive sexual desire, preached a Buddhistic suppression of all desire. Spencer, in his selfish laziness, enshrined selfishness and individuality as the highest social state. Nietzsche, harried by the herd, built out of his broken body and suppressed desire for dominance his vision of the Superman.

Objective? All deductive philosophy is merely subjective. Since science is orderly thinking about all the phenomena of the universe, philosophy, as long as it remains orderly thinking, must be a branch of science: to be more specific, of sociology. Philosophers, properly considered, belong to one of two classes: intuitive graspers of truth, or superscientists, generalizing from the highest generalizations attainable in all the sciences to a grasp of still broader relationships. The intuitive philosopher follows the intuitive poet, in grasping toward truth; but neither poet nor philosopher of this type can convince others, except by his mere faith, that he is approaching truth. When the scientist receives his intuitive flash of the same thing, after a thorough preliminary study of the data of science upon the matter, he can convince the thinking world, by proper marshalling of his evidence: and he is usually wholly unaware of the previous utterances of intuitive poet and philosopher. Thus the intuitive philosopher is a necessary human ornament, rather than a thing of utility in the growth of thinking processes.

The philosopher who is a superscientist is, properly speaking, merely a higher type of inductive scientist. He is learned in the highest advance of science, and builds outward from science's furthermost outposts. The average training for a philosopher today, in the philosophies of the past, is merely a training in man's enmummied ignorance; instead, a thorough grounding in all the sciences is the only substantial basis for the philosopher of today or tomorrow. With Comte we repeat, man passes through three stages of thinking, the superstitious or religious; the metaphysical or philosophic;

and the positive, or scientific. Man today has risen to the third: philosophy, as a major human activity, subject to the one exception noted above, that of the superscientist, is as extinct as the predecessors of the dodo.

For the facts are the garments that invisible truth wears; and we may at least finger the robes, that some of the virtue may pass into us, and heal us of our worst disease, ignorance. Man's collective task is to sow in every human field as much of the seeds of knowledge as it can receive: the harvest will be ample, and serene, and peaceful, and shining. Or, if it is not, what can a wellwisher for man hope for, but that he be himself in the highest sense, whether the end be a dimness or a splendor.

ADDITIONAL READINGS

The writings of Herbert Spencer, Bergson, Croce, James, Dewey, and the other moderns, are easily available, for those especially interested.

Tertium Organum, by P. D. Ouspensky is the brilliant explanation of philosophy stemming out of Einstein; although allowance must be made for lapses into mysticism.

Thus Spake Zarathustra, by Nietzsche, is the most enjoyable of the strange philosophic poems of the laureate of the Superman.

THE MARCH OF MANKIND

In the six parallel columns of these chronological tables, man's achievements in history, science, literature, art, religion, and philosophy are listed. By glancing across the page, it will be possible to see man's state of progress in any century, or any part of a century.

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
1,497,000,000	Formation of earliest rocks					
1,000,000,000	First life					
600,000,000	First invertebrates					
360,000,000	Shellfish Armored fishes Lung fishes Amphibians Land vertebrates Primitive reptiles					
150,000,000	Dinosaurs Birds Archaic mammals					
40,000,000	Higher mammals					
500,000	Man-ape 1st glacial period 1st interglacial period 2nd glacial period					

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
250,000	2nd interglacial period Heidelberg race					
125,000	3rd glacial period					
75,000	3rd interglacial period Piltdown race 4th glacial period	Chipped stone implements				
50,000	Post-glacial period Grimaldi Negroids Cro-Magnon race Grenelle race			Altamira murals Bassempuoy statuettes		
10,000	Neolithic or polished stone age men	Polished stone implements Fire Domestication of animals Domestication of plants			Early animism Early fetichism Early totemism Early shamanism Early idolatry Early theism	
4241	Calendar devised in Egypt	Calendar			Egypt worships Isis and Osiris	
4000	Age of Metals					
3000	Troy Founded Old kingdom in Egypt (down to 2500 B. C.) Cheops	Early Egyptian science		Great pyramids in Egypt		
2500	Hittite empire begun		Early Egyptian literature	Egyptian sculpture	Celtic religion	

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
2100	Hammurabi in Babylon		Code of Hammurabi		Ishtar and Tammuz worshipped in Babylon	
2000	Phoenicia begins Civilization in China Cretan civilization in Greece		Gilgamesh epic	Babylonian architecture	Vedas in India	
1950	Hittites invade Mesopotamia Achaeans invade Greece Swiss lake-dwellers invade Italy					
1900	Hyksos in Egypt					
1750	Shang dynasty in China				Abraham in Chaldea	
1700	Jews in Egypt		Chinese lyrics	Temple of Karnak built		
1500	Dorian invasion of Greece Palestine settled by Philistines		The Book of the Dead	Egyptian painting	Bal-Marduk in Babylon	
1375	Amenhotep (Ikhnaton) in Egypt				Ikhnaton and monotheism in Egypt Moses	

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
1350	Exodus of Jews from Egypt					
1325	Achaeans take Asia Minor coasts					
1200				Greek architecture of Mycaean Age	Cretan worship of Ops	
1125	Chow dynasty in China					
1100	Assyria conquers Babylon	Alphabet, navigation in Phoenicia	Homeric epics			
1075	Saul king in Palestine		The Song of Deborah			
1050	David				Indo-Greek gods in Greece	
1000	Solomon emperor in Palestine		Hesiod	Temple of Solomon	David alters Yahweh Zoroaster in Persia	
	Etruria settled					
	Tyre at its greatest					
	Asia populates Oceania by canoe		Zend-Avesta			
800	Building of Carthage Age of Confusion in China begins			Assyrian temples Assyrian sculpture		

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
790	Ethiop conquest of Egypt				Hebrew prophets	
776	First Olympiad					
753	Rome built					
745	Tiglath-Pileser III founds the new Assyrian empire				Amos Hosea	
735	Greeks settle Sicily				Greek gods to Rome	
721	Sargon II exiles the ten tribes of Israel					
704	Sennacherib			Sculpture at Karnak	Upanishads	
664	Psammetichus founds XXVIth dynasty			Doric temples in Greece		
636						Thales of Miletus
605						Anaximander of Miletus
600	Median empire					
596	Solon in Athens					
586	Nebuchadnezzar carries Judeans to Babylon				Orphic mysteries in Greece	
560			Chinese songs collected		Mahavira, Buddha Confucius, Lao-tze	Anaximenes of Miletus

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
550			Sappho, Alcaeus Anacreon		Jeremiah, Ezekiel, 2nd Isaiah	Heraclitus of Ephesus
539	Cyrus founds Persian empire	Pythagoras	Old Testament organized			
536				Pythagoras explains musical scale		Pythagoras
510	Sons of Pisistratus exiled from Athens					Parmenides
500	Hundred years of peace in China begins		Pindar			Anaxagoras
492	1st Persian attack on Greece			Behistun rock		
490	Battle of Marathon			Eumarus		
484			Herodotus born	Cimon		
479	Greece repulses Persia		Aeschylus wins 1st prize for tragedy	Ionian architecture Corinthian architecture		
470				Myron		
466	Pericles			Polycletos; Phidias Parthenon built		Socrates born
438			Sophocles	Praxiteles, Lysippus, Scopas		
431	Peloponnesian war begins		Herodotus recites his history in Athens	Greek dances and music		

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
427			Euripides Aristophanes	Polygnotus; Apollodorus; Zeuxis		Plato born
400						
390	Gauls sack Rome		Thucydides Xenophon			
384		Aristotle		Parrhasius		Aristotle born
338	Philip of Macedon conquers Greece		Demosthenes			
334	Alexander the Great				Cybele worship in Rome	
323	Alexander dies			Aristoxenus, Greek authority on music		
321	Chandragrupta in India Rome loses at Caudine Forks		Mahabharata Ramayana	Appian Way built		Epicurus Zeno the Stoic
264	Asoka in India First Punic War			Indian sculpture Topes and pagodas		
219	Second Punic War					
214	Shi-hwang-ti in China	Great wall of China built	Theocritus			
201	Rome fights Macedon					
156					Lao-tze made a god	

Year	History	Science	Literature	Art	Religion	Philosophy
B. C. (Before Christ)						
149	Third Punic War					
133	The Gracchi					
100	Marius					
91	War of Roman allies		Ennius			
78	Sulla dies					
73	Slave revolt under Spartacus		Meleager Lucretius			
70						Lucretius
53	1st triumvirate in Rome		Julius Caesar, Sallust, Cicero			
44	Julius Caesar killed					
31	Augustus defeats Antony at Actium		Virgil, Horace, Livy, Ovid Daphnis and Chloe	Roman dancing Augustan architecture in Rome		
4					Jesus of Nazareth born	
A. D.					Augustus made a god	
14	Tiberius emperor					
30					Jesus crucified	
54	Nero				Paul	
69	Vespasian and the Flavian emperors			Arch of Titus built	Early gospels The emperors as gods	

Year	History	Science	Literature	Art	Religion	Philosophy
A. D.						
96	Nerva and the Antonines					
100				Ptolemy wrote on music	Gospel of St. John	
161	Marcus Aurelius; the great plague				Mithra-worship in Rome	
180	Century of war and disorder in Rome					
220	End of Han dynasty in China			Christian catacombs		
227	Sassanids rule Persia				Shintoism in Japan	
270	Aurelian emperor					
284	Diocletian emperor persecution of Christians					
313	Constantine makes Rome Christian			Christian churches	Constantine made Rome Christian	
361	Julian the apostate					
384				St. Ambrose's music		
425	Teutons overrun the Roman empire					
429	Vandals invade Africa					

Year	History	Science	Literature	Art	Religion	Philosophy
A. D.						
451	Attila the Hun raids Rome					
455	The Vandals sack Rome					
470	Ephthalites invade India				Christian hermit the social ideal	
476	End of the western Roman empire					
481	Clovis king of the Franks					
493	Theodoric the Ostrogoth king of Italy	Gunpowder in China			Buddhism enters Japan	
527	Justinian emperor of the East			Church of St. Sophia built by Justinian		
565	Lombards conquer Italy			Gregorian chants		
570	Muhammad born				Muhammad born	
593		Block-printing in China				
600	Tang dynasty in China					
622			Beowuf		The Hegira or flight	
632			The Koran		Muhammad dies. Abu Bekr caliph	

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 634					Omar caliph	
638	Omar takes Jerusalem					
687	Pippin unites Austrasia and Neustrasia			Byzantine architecture		
711	The Moslems invade Spain					
712	Ming Huang rules in China		Li T'ai-po, Tu Fu, Po Chu-i			
714	Charles Martel mayor of the palace					
732	Charles Martel defeats the Moslems at Tours					
751	Pippin king of the Franks					
771	Charlemagne sole king		Hitomaro, Akahito			
786	Haroun-al-Raschid caliph in Bagdad			Mosque of Cordova built		
800	Charlemagne crowned emperor					
850	Rurik, a Northman, rules Novgorod and Kieff		The Arabian Nights' Entertainments			

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 886	Danes overrun England					
960	Sung dynasty in China					
990			Firdousi, Persian poet Tsurayaki	Guido of Arezzo in music		
1013	Cnut king of England, Denmark and Norway		Omar Khayyam	Cathedral of Worms built Franco of Cologne on music		
1066	William duke of Normandy conquers England			Romanesque sculpture		
1071	Seljuk Turks revive Islam		Mutamid of Seville			
1095	The first Crusade					
1099	Crusaders capture Jerusalem Huns invade China again				Crusading knights as social ideal	
1147	The second Crusade		Poems of the Cid Geoffrey of Monmouth	Gothic architecture		
1187	Saladin recaptures Jerusalem					
1189	The third Crusade		Troubadours	The Troubadours in France		

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1198			Minnesingers			Averroes of Cordova, an Arabian philosopher, died
1202	Fourth Crusade attacks Eastern empire	Arabic numerals enter Europe	Niebelungenlied	Chanson du Roland		
1212	The Children's Crusade		Layamon			
1214	Jenghis Khan takes Pekin			Romanesque architecture		Roger Bacon born
1215	Magna Carta signed					
1221	Return of the fifth Crusade		The Younger Edda			
1225					Dominican and Franciscan orders founded	Thomas Aquinas
1228	Sixth Crusade					
1240	Mongols overrun Russia			Cimabue Adam de la Hale in music Song "Sumer is icumen in"		
1241				Cathedral of Rheims built		
1244	Seventh Crusade		Romance of the Rose			

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1248				The Alhambra built		
1260	Kublai Khan becomes great Khan		Dante			
1271			Marco Polo's travels	Giotto		Duns Scotus
1293		Roger Bacon died				Roger Bacon died
1308						
1320		Gunpowder in Germany				
1340			Chaucer born			
1348	The Great Plague, or Black Death		Gower	Sebald Schonhofer		
1360	Ming dynasty in China		Petrarch Boccaccio			
1367	Timurlane, Great Khan		Langland	Van Eyck born		
1378	Two Popes, one in Italy one in France			Furniture becomes common		
1381	Wat Tyler's revolt of English peasants			Fra Angelico, the Holbeins Ghiberti; Donatello		
1384					John Wyclif died	
1398					Huss preaches	

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1415		Wood engraving introduced		Filippo Lippi	Huss burned	
1420	Crusade against Hussites			della Robbia		
1431	Crusade defeated		Villon	Renaissance architecture		
1445	Portuguese discover Cape Verde			John Dunstable in music Josquin des Pres, music		
1446		Printing by movable type	First printed books (Coster in Haarlem)	Perugino born		
1453	Ottoman Turks take Constantinople		Machiavelli	Giorgione; Titian		
1471				Michael Angelo born Durer born		
1480	Mongols expelled from Russia			Dancing in Italy	Inquisition in Spain	
1483		Compass; sextant	Don Quixote	Raphael born		
1486	Diaz rounds Cape of Good Hope					
1492	Columbus discovers America				Alexander VI, a Borgia, pope	
1498	Vasco de Gama reaches India					

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1499	Switzerland independent	Maps of the world	Tasso; Ariosto			
1517			Luther translates the Bible	Cellini born	Luther announces his theses at Wittenberg	
1519	Cortez takes Mexico			Leonardo da Vinci died		
1525	Baber founds Mogul empire			Palestrina born		
1530	Pizarro takes Peru				The Anabaptists	
1539				Boulle, cabinet-maker		
1543		Copernicus dies	Wyatt; Surrey			
1547	Ivan the Terrible rules Russia		Rabelais			
1561				Rubens born		Francis Bacon born
1564		Galileo born	Spenser's Faerie Queene Shakespeare born			
1567	Revolt of the Netherlands			Monteverde born	Church of England founded	
1571		Kepler born	Lope de Vega Elizabethan drama			
1587		Harvey born		El Greco Franz Hals		

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1596		Descartes born				Descartes born
1601		Tycho Brahe died			Shintoism revived in Japan	
1609	Virginia settled	Microscope invented Logarithms invented	Captain John Smith	Rembrandt Velasquez		
1632				Murillo Taj Mahal built		Spinoza and Locke born
1638	Japan closed to Europeans until 1865		Bay Psalm Book			
1642		Galileo died; Newton born				Leibnitz
1643	Louis XIV reigns	Barometer invented				
1644	Manchu dynasty, China		Corneille; Racine; Moliere			
1648	Treaty of Westphalia Holland and Switzerland free					
1649	Charles I of England executed	Air pump invented	Elder Edda collected	The minuet reaches Paris		
1659			John Milton	Scarlatti born		
1660	Restoration of the Stuarts			The waltz reaches Paris		

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1674	New Amsterdam becomes New York	Velocity of light determined; spermatozoa discovered; yeast cells discovered; bacteria discovered				
1683	Turks hurled back at Vienna		Dryden	Watteau born Bach and Handel born		Bishop Berkeley born
1688	William of Orange rules England					
1689	Peter the Great in Russia					
1694			Voltaire born	Hogarth born		Voltaire born
1711						
1713	Frederick the Great of Prussia born					
1714	George I of England			Gluck born		
1715	Louis XV of France			Reynolds; Gainsborough		
1724			Pope			Kant born
1732	Oglethorpe founds Georgia	Watt born		Haydn born		
1747		Linnaeus		Canova born		
1755	England fights France over America					

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1756			Burns	Mozart born		
1760	George III of England		Blake			
1762	Catherine the Great rules Russia			French furniture		Fichte born
1764		Spinning jenny invented				
1765		Steam engine invented				
1769	Napoleon born		Goethe Schiller			
1770				Thorwaldsen and Beethoven born		Hegel born
1774	The American Revolution	Buffon	Samuel Johnson Swift			
1775				Turner born	Thomas Paine	Schelling born
1780				Ingres born		
1783	The American Revolution ends	Priestly The steamboat invented	Wordsworth; Coleridge	Weber born		
1788		Galvani	Casanova			Schopenhauer born
1791	The French Revolution			English furniture Duncan Phyfe in America		
1793		Cotton gin invented				

Year	History	Science	Literature	Art	Religion	Philosophy
A. D.						
1795	Napoleon commander-in-chief	Modern age of inventions in full swing	Richardson; Fielding			
1797		Cuvier		Schubert born; the waltz becomes popular		Comte born
1798		Laplace				
1800	England and Ireland united	Volta				
1802				Landseer born		
1803				Berlioz born		
1804	Napoleon emperor		Heine			
1805					Joseph Smith born	
1809		Dalton's atomic theory		Mendelsshon and Chopin born. Gilbert Stuart.		
1811				Liszt born. Schumann		
1813				Wagner born Verdi born		
1814	Napoleon abdicates					
1816		The stethoscope invented				
1819	First English factory act passed	Electro-magnetism	Scott; Byron; Shelley; Keats		Bahaism in India	

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1820		Humboldt			Mary Baker Eddy born	Herbert Spencer born
1821	Greece frees itself		Washington Irving The Parnassians			
1830		First railway, Liverpool to Manchester	Pushkin		Mormonism spreads	
1837	Queen Victoria	Telegraph invented	Anacreontic from Virginia	Brahms; Saint-Saens		
1839		Cell theory; photography		Moussorgsky born		
1840				Tschaikovsky born		
1841		Faraday		Dvorak born		
1844			Bryant; Longfellow; Poe	Rimsky-Korsakov born		Nietzsche born
1848	Revolutions in France and Italy	Neptune discovered	Lermontov			Dietzgen; Marx; Engels
1851		Electric locomotive	Balzac; Dumas; George Sand			
1852	Napoleon III of France					
1854	Crimean War; Admiral Perry in Japan	Agassiz	Walt Whitman Symbolists	Humperdinck born		

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1856				Leoncavello; Puccini	Shintoism revived in Japan	Bergson born
1861	Victor Emmanuel, King of Italy; Civil War in the United States	Darwin	Dickens; Thackeray; George Eliot Echegaray			
1864	Maximilian, emperor of Mexico			Mascagni; Richard Strauss		
1865	Japan opened to the world		Flaubert			
1867	Maximilian shot	Huxley; Haeckel				
1869		Dynamite invented by Nobel	Gogol			
1870	France defeated by Germany King of Prussia becomes German emperor	Pasteur		Rodin Greig		
1873		The typewriter invented	Benavente Dostoievsky; Turgueniev			
1876		The telephone invented				
1877	Russo-Turkish War	The phonograph invented	Lanier; Tennyson; Browning; Swinburne			

Year	History	Science	Literature	Art	Religion	Philosophy
A. D.						
1878		Incandescent lamp				
1879		Automobile				
1881	Transvaal free		Galdos			
1883	Britain occupies Egypt					
1884		Trolley car invented				
1886	Gladstone's 1st Irish Home Rule bill		Ibsen			
1888		The adding machine				
1890	Bismarck dismissed. England cedes Heligoland to Germany	Lester Ward	Samuel Butler	Whistler; Winslow Homer		
1893		Motion picture machine	Tolstoy	Manet; Picasso; Matisse; Monet		
1894	Japan fights China					
1895		Radio invented	Ibanez			
1898	Spanish-American war					
1899	Boer war begins					
1900	Boxer risings in China		Tagore			Croce

Year	History	Science	Literature	Art	Religion	Philosophy
A. D. 1903		Airplane invented		Gaugin		
1904	Russo-Japanese war	Psychoanalysis	Frank Norris; Robinson; Frost; Mark Twain; Hauptmann; Schnitzler; Molnar			
1907			Leonard Merrick; Cannan; Shaw; Chesterton; Chekov; Andreyev; Strindberg; Hamsun; Brandes		Confucius made a god	Russell; James; Dewey
1908	Austria annexes Bosnia and Herzegovina					
1911	Italy takes Tripoli from Turkey	Hydroplane				
1913	Balkan League fights Turkey	Einstein	Barbusse; Dreiser; Anatole France	Negro dances reach the ballroom		
1914	World War begins					
1917	The Russian Revolutions. Bolshevik regime established			Bellows		
1919	End of World War	Radio perfected		Negro spirituals		Ouspensky
1921	Italian Fascism					
1926	Locarno treaty	North Pole flight				
1927		New York to Paris non-stop flight		American stepback architecture		

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